NORTHWESTERN UNIVERSITY—NEW YORK UNIVERSITY NUMBER

Vol. 31 MAY, 1945 No. 5



# American Journal of Orthodontics and Oral Surgery

FOUNDED IN 1915



CONTENTS

ORTHODONTICS

The Construction and Use of the Orthodontic Appliance According to Hellman's Concept and Technique. M. Albert Munblatt, D.D.S., New York, N. Y. ---- 243

Prevention and Alleviation of Developing Class III Malocclusion. Ulysses Erdreich, D.D.S., Poughkeepsie, N. Y. ---- 269

Soil Fertility and Its Health Implications. William A. Albrecht ---- 279

Honor Roll of A.A.O. Members Serving in the Armed Forces ---- 287

Orthodontic Abstracts and Reviews ---- 289

News and Notes ---- 294

Officers of Orthodontic Societies ---- 295

ORAL SURGERY

Northwestern University

Osteogenic Sarcoma of the Mandible. Frederick W. Merrifield, D.D.S., M.D. 289

Principles Concerning the Extraction of Teeth. Warren R. Schram, D.D.S., M.S.D. ---- 298

Fusiform Bacilli and Vincent's Spirilla in Infections of Impacted Molars. John Vernon Lenburg, D.D.S., M.S.D. ---- 302

Comparison of Sulfathiazole With Sulfamerazine in Extraction and Impaction. Russell G. Boothe, D.D.S., M.S.D. ---- 305

New York University

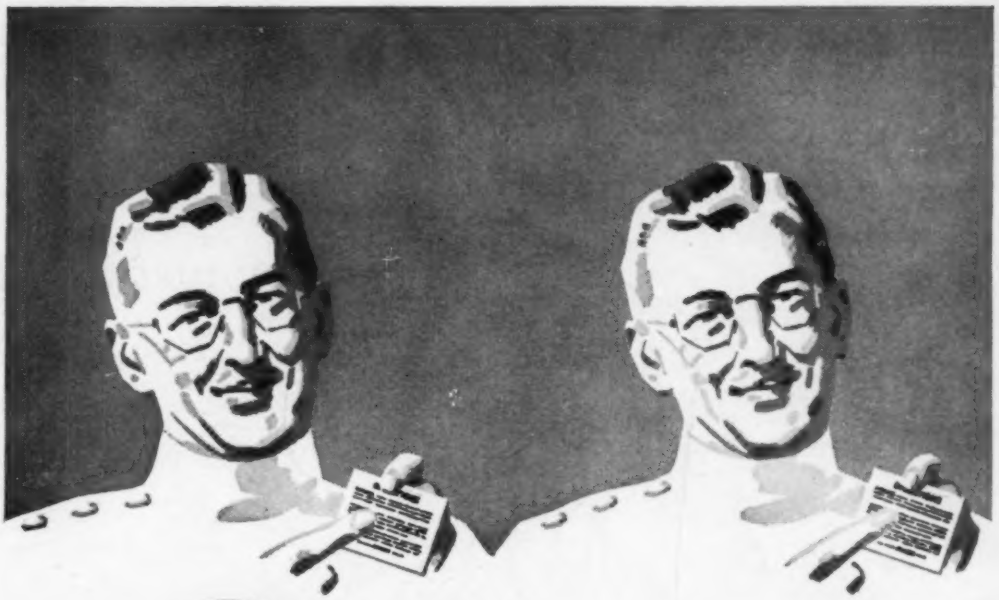
A Clinical Evaluation of Local Anesthetic Solutions of Increased Strength. Leo Winter, D.D.S., M.D., and M. L. Tainter, M.D. ---- 307

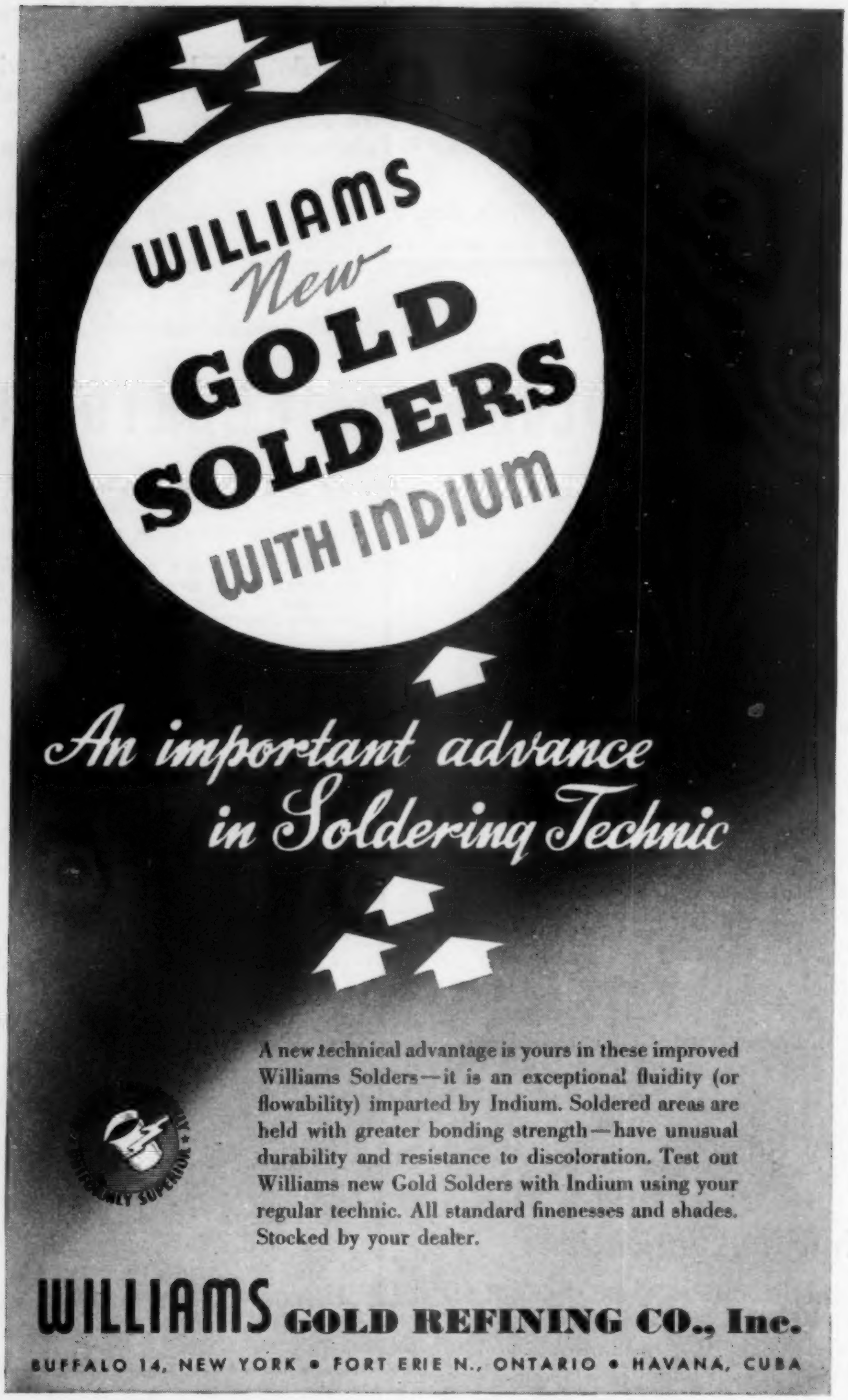
Oral Manifestations of Acute Myelogenous Leucemia. Leon J. Allen, D.D.S., Mt. Vernon, N. Y. ---- 324

Salivary Calculus in Submaxillary Region. Andrew J. Bochicchio, D.D.S., New York, N. Y. ---- 327

Published by THE C. V. MOSBY COMPANY, St. Louis, U. S. A.

Vol. 31, No. 5, May, 1945. American Journal of Orthodontics and Oral Surgery is published Monthly by The C. V. Mosby Company, 3207 Washington Blvd., St. Louis 3, Mo. Subscription Price: United States, Its Possessions, Pan-American Countries, $8.50; Canada, $10.00 (Canadian Currency); Foreign, $9.50. Entered as Second-class Matter at Post Office at St. Louis, Mo., under Act of March 3, 1879. Printed in the U. S. A.




WILLIAMS
New
GOLD
SOLDERS
WITH INDIUM
An important advance
in Soldering Technic
A new technical advantage is yours in these improved Williams Solders—it is an exceptional fluidity (or flowability) imparted by Indium. Soldered areas are held with greater bonding strength—have unusual durability and resistance to discoloration. Test out Williams new Gold Solders with Indium using your regular technic. All standard finenesses and shades. Stocked by your dealer.
WILLIAMS GOLD REFINING CO., Inc.
BUFFALO 14, NEW YORK • FORT ERIE N., ONTARIO • HAVANA, CUBA

MAY, 1945

# Orthodontics



Office of the Editor: 8022 Forsythe Boulevard, St. Louis
Published by The C. V. Mosby Company, St. Louis

American
Journal of Orthodontics
and Oral Surgery



VOL. 31 MAY, 1945 No. 5

## Original Articles

# THE CONSTRUCTION AND USE OF THE ORTHODONTIC APPLIANCE ACCORDING TO HELLMAN'S CONCEPT AND TECHNIQUE

M. ALBERT MUNBLATT, D.D.S., NEW YORK, N. Y.

THERE has been considerable misunderstanding and speculation about the appliance used by Hellman in the treatment of malocclusion. The statement has often been made that the appliance is old-fashioned and nothing else but the original Angle E band and expansion arch. The general knowledge is that a labial arch was used, and since it is commonly believed that it is either impossible to work without, or better tó work with, a lingual arch in conjunction with the labial arch, his technique is sometimes erroneously referred to as the labio-lingual technique.

The fact is that active treatment according to Hellman's technique is done by the labial arch and wire ligatures only, both in the maxilla and the mandible. A lingual appliance is never used for active treatment and is used only as a retainer in the mandible when considerable tooth movement has been accomplished. Its use in conjunction with intermaxillary elastics to retain mesiodistal relationship, such as in Class II cases and its ramifications, will be explained later. Bands other than those on the first molars are used as little as possible. Whenever a certain tooth needs considerable rotation, a band is resorted to, and only after an attempt has been made first to perform the rotation by the creation of room and the use of spurs and finger springs in conjunction with the wire ligatures.

All types of malocclusion are treated with the labial arch. A bite plate is used to open the bite whenever necessary before mesiodistal shifting is started, and occipital anchorage in the form of head caps or chin caps is never used. The construction of the appliance including the bite plate can be more easily demonstrated at a clinic than described in a paper. Its application in the treatment of

Read at the fall meeting of the New York Society of Orthodontists, Nov. 13, 1944.

different cases of malocclusion is even more difficult to explain without actual demonstration at the chair. An attempt will be made, however, to describe as much as possible in the hope that this presentation will be clear enough for you to grasp something of benefit. Before this is done, a discussion of the technical and scientific principles involved in orthodontic treatment is advisable.

It is generally admitted that orthodontic treatment involves biologic problems of dental development and facial growth. Just what is the relationship between these problems and actual treatment, although clear to some, is not so clear to others; and too often the type of the appliance becomes the essential factor about which our scientific principles are evolved. While it is conceded that the appliances are only instruments with which tooth movement and other changes of the dental apparatus are obtained, the general inclination is to find an ideal appliance which will solve our many problems of treatment. Whenever difficulties of treatment arise, the tendency is to look for another appliance. Very often the method or technique of treatment is named according to the appliance used. We seem to overlook the fact that our most perplexing problems are not due to appliances alone. Technical difficulties can arise with every type of appliance and are affected by the personal equation of the individual operator; but there are certain technical and biologic principles which are universal and must be understood, which, if properly understood, can form a basis of agreement toward the solution of our many problems.

Orthodontics is basically concerned with the treatment of malocclusion of the dental apparatus. We are involved in facial characteristics. Besides correcting the irregularities of the teeth to obtain a good functional occlusion, we are greatly interested in esthetics. Knowledge of facial growth and dental development is of great importance. That there is a relationship between facial growth and dental development can be readily recognized, but how much one is dependent upon the other is still a moot question, and it is not my present intention to offer a solution for this problem. It is generally agreed that the treatment of malocclusion in the great majority of cases improves the facial outline and appearance. The assumption that the dental apparatus is the only culprit is placing an unjustified burden upon the orthodontist. Careful observation and diligent study definitely show us that there are certain characteristics in every face which cannot be changed by orthodontic treatment of any kind, even when we resort to the extraction of teeth.

We have also learned through the investigations of Hellman,[1] Brodie,[2] Broadbent,[3] and others, that there are ideal stages of dental development and facial growth for the institution of orthodontic treatment. How much we vary our influence upon facial growth by a variation of the time at which we begin our treatment is also a moot question; but the end result on dental occlusion is better known to be more successful if we start treatment during the favorable stages of dental development and facial growth. The difficulty of understanding the relationship between facial growth and dental development and the effect of our treatment of malocclusion upon the outline of the face has led us even to doubt Angle's classification of malocclusion, although anthropologic studies are beginning to prove it scientifically correct (Krogman,[4] Todd[5]). More than we realize, and in spite of the many attempts to deviate from it, Angle's classification of malocclusion has been the greatest contribution to scientific orthodontics,

as pointed out by many of his followers.[7] The difficulties we have met in attaining the desired results in order to meet the goal of normal occlusion as described by Angle, even more than the complication of the relationship of our treatment to the facial outline, are responsible for the frequent indications of doubt about the correct significance of that classification. The orthodontic appliance is often involved in this confusion.

To simplify this situation, we are obliged to agree that, common to all types of appliances, there are three main objectives. They are: (1) to get a good result in the treatment of the prevailing malocclusion, (2) to maintain and retain the result after we get it, (3) to obtain a favorable change in the face of the patient at the completion of the treatment. When difficulties are met in the achievement of any one of these objectives, the tendency is to find fault with the appliance. We seem to overlook the fact that in their achievement we are mainly dependent upon the basic knowledge, training, and skill of the individual operator. Changing the appliance or complicating it by the addition of many kinds of attachments will in no way alter this basic fact. Ability to correlate the different aspects of the problem involved in an individual case comes mainly from experience; and the aptitude to make proper decisions regarding the timing of the various procedures cannot be substituted by special types of appliances. Cooperation of the patient to follow out instructions in the wear and care of appliances is of extreme importance; and the pernicious habits of the patient which tend to interfere with this routine should be taken very seriously at all times and if possible eliminated at the beginning. We should also recognize certain limitations over which we have no control as yet, but we must be able to distinguish them from those that are definitely due to faulty technique.

An orthodontic appliance, regardless of everything else, should be efficient, but it must always be kept under control. The more we try to make it automatic, the more we complicate it and lose that control. All types of appliances can damage the teeth and the surrounding structures. They should be constructed so as to facilitate their frequent removal for adjustments and observation of their action upon the occlusion and their effect upon the teeth and the surrounding structures. Prophylactic measures cannot be instituted too often. While we may not be able always to eliminate entirely the harmful effects of our appliance, we must keep them down to a minimum. The simpler the appliance, the more will we be able to do this. The labial arch in conjunction with wire ligatures, if properly used, can perform any desirable tooth movement as well as, and with less damage and more simplicity than, any appliance in use today. Of course there may be a justified objection to the use of wire ligatures. With some patients, they can become a great annoyance; but, if properly used, they can offer many advantages over the special brackets and attachments employed in the more complicated appliances.

Experimental studies and clinical observations of Oppenheim,[6] and others, indicate that continuous action in the movement of teeth is more harmful than intermittent action with rest periods in between. The wire ligatures, if properly used, exert positive action for only about a day or two, and the rest of the time between visits remain passive. This allows for regenerative processes to make the necessary tissue repairs. The proper use of the labial arch with the wire ligatures necessitate weekly visits of the patient to the office. At one sit-

ting the ligatures are tightened, and at the next the arch is removed, adjusted, replaced, and religated. By this method the action of the appliance is progressively positive but not continuous. A good deal of practice, training, and experience is necessary in the use of the wire ligatures and the labial arch. The results which can be obtained with this simple appliance justify the effort necessary in mastering its use. Its very simplicity forces the operator to keep on the alert, to recognize and study the individual problems involved, and to depend less on special attachments which may confuse him and obscure the main issues. Of course, there are many individuals who tend to use complicated attachments. Fault cannot be found with that, but care must be exercised not to put too much faith in their ability to solve our problems. It is my belief that in the attempt to prove the merits of preferred appliances or attachments, it is wrong to ignore basic principles firmly established, and to adopt new ones which have no foundation. I feel that this is a propitious time for our profession to clear up the confusion that exists on that score and lay the groundwork for a common understanding to enable us to attack the real problems of orthodontics together.

## CONSTRUCTION OF THE APPLIANCE

An appliance may be simple but care must be exercised in its construction. According to Hellman's technique, the whole appliance, including the molar bands, is constructed on the plaster model. After all preliminary steps are taken and record casts of the mouth are made, a good compound impression is taken of the maxillary dental arch. Separating ligatures are inserted mesially and distally to the maxillary first molars, and the patient is dismissed. A plaster model is poured from the compound impression and allowed to dry. The dry model is then prepared for the construction of the molar bands. Care must be exercised in this as in any other step.

The molar band is the foundation of any appliance. A poor fitting molar band can give us an endless amount of trouble. It must be strong enough to withstand the stresses of mastication and the forces butted against it during treatment. Some prefer to construct this band by the direct method and can make a good job of it. We must realize that the natural bell shape of the molar tooth precludes a perfect fit. By the use of good strong band material and proper instruments, a careful operator can contour and construct a good band in the mouth. This necessitates chair time and very often it becomes a severe strain on the operator and the patient. In some cases it is almost impossible to get good access for careful work. In order to save chair time and overcome these difficulties, the indirect method is used and the whole appliance is constructed on one plaster model.

To prepare the model for the construction of the molar band, a proper understanding of the anatomy of the molars is very important. The first molars, especially during the ages when treatment is started, are usually not fully erupted through the gingival tissues. A good band should cover most of the crown of the molar except the occlusal surface and should extend below the free margin of the gum. The plaster is cut away about 2 mm. at the cervical border of the molar, and the proper contour of the crown of the tooth is carved out. Interproximally on both sides of the molars the adjoining teeth are cut away

deep enough to allow a strip of band material, 7/32 inch wide and 0.008 inch thick, to pass through, rest at the base and barely extend over the mesial and distal marginal ridges of the molars. Care should be exercised not to cut into the molars which are to be banded, and a shelf in the plaster at the base of each first molar should be made parallel to the occlusal plane (Fig. 1). To allow room for the beaks of the band-forming pliers to pinch the band at the mesiobuccal angle of the molar, the distobuccal corner of each second premolar is cut away (Fig. 1).

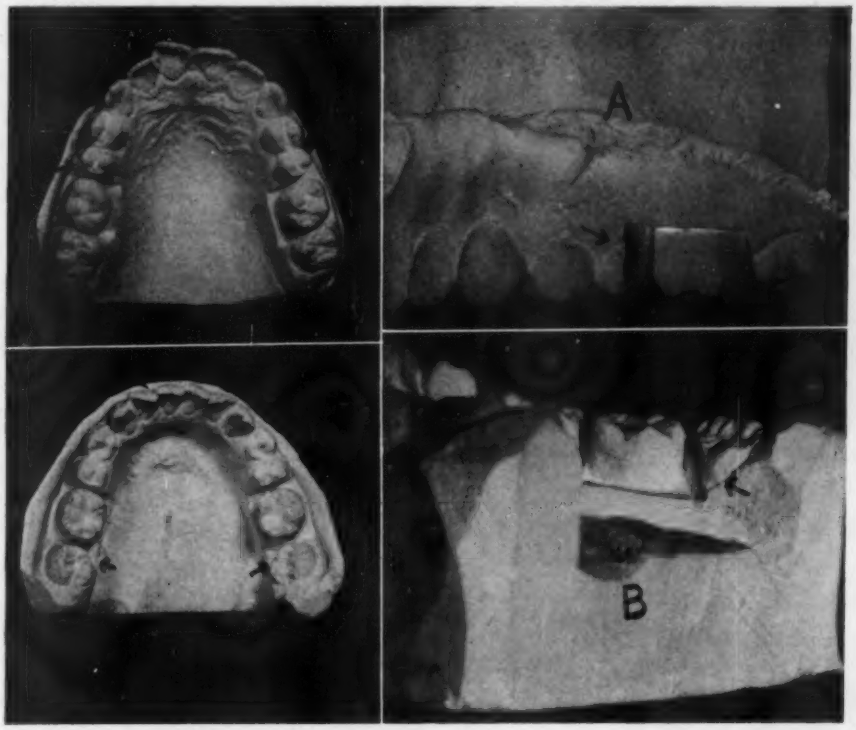



Fig. 1.—Casts of maxillary and mandibular dental arches poured from compound impressions showing molars trimmed for construction of bands. Enlargements: *A*, maxillary molar area shows the distobuccal corner of the second premolar cut away for the beaks of band-forming pliers, and *B*, mandibular molar showing mesiolingual corner of second molar cut away for the beaks of pliers.

Coin gold band material 7/32 inch wide and 0.008 inch thick is used because it has been found best suited to this technique. All soldering is done with 22k solder until the band is completed and reinforced. Thereafter, 18k solder is used to add any attachments.

After the model is properly prepared, the strip of annealed band material is wrapped tightly around the upper molar and pinched with Pullen band-forming pliers (Fig. 2) at the mesiobuccal angle. The beaks of the pliers are worked up and down from occlusal to cervical so that a perfect crease is formed which fits the tooth snugly at that corner. The strip of metal is then removed from the model and the excess material cut away, allowing an edge of at least 1 mm. to extend at each end. The open cylinder of metal is placed back on the molar in the same position as before and the crease is made sharper by repinching the metal with the band-forming pliers at the joint. The cylinder is then removed, held with a pair of soldering tweezers (Fig. 3), and soldered with 22k

solder, so that the inside of the joint is flush with the surface of the band material. The excess metal at the joint is cut away, ground down with a stone, and smoothened out with a cuttlefish disk not too closely to avoid weakening the joint.

The cylinder is then placed back on the molar in its original position. We then have a band fitting pretty well at the cervical border and, except for the mesiobuccal corner, standing away from the tooth all around the occlusal border. Starting at the mesiobuccal-occlusal corner with a foot plugger (Fig. 3), the metal is pressed against the tooth at the occlusal edge, worked toward the mesial marginal ridge and dented there. Starting again at the mesiobuccal-occlusal corner, the foot plugger is pressed against the metal on the buccal side, worked toward the buccal grove and dented there. Another dent is made at the lingual groove and another dent at distal marginal ridge. The band now fits the tooth all around cervically and touches occlusally at the mesiobuccal corner between and including the buccal groove and the mesial marginal ridge, at the lingual groove, and at the distal marginal ridge. The band protrudes from the tooth occlusally at the distobuccal, distolingual, and mesiolingual corners. The dented band is then carefully removed from the model with a pointed scaler (Fig. 3). With a pair of curved crown shears the band is slit to a depth of about one-half of the width of the band material at the distobuccal corner, distolingual corner, and mesiolingual corner, holding the curve of the shears in the same direction so that the three slits are parallel to each other. The band is then placed back on the model and pressed home. (Fig. 2.)

Starting at the mesiobuccal corner, the protruding edges of the band are pressed against the tooth occlusally and worked all around, overlapping the slitted edges until we have a close-fitting band at the occlusal (Fig. 2). The band is carefully removed again and soldered on the inside of the overlapped joints with 22k solder. For further reinforcement, small pieces of solder are flowed on the outside at the buccal groove, the lingual grove, the distal marginal ridge, and the mesial marginal ridge. The band is smoothened out with a stone and finished off with cuttlefish disks. It is slightly trimmed interproximally on the mesial and distal at the cervical edges and leveled out with a flat gold file all around the occlusal edge. We then have a finished band which should fit the molar snugly, and be strong enough to retain its shape for the duration of treatment. A well-fitted band so constructed should not come off between recementations.

When both molar bands are completed, we are ready to add the additional attachments which are necessary. A lingual spur is always soldered on the molar bands. In the maxillary molars it is used when needed to help support a bite plate and fits into a groove in the plate. A little hole is made mesially in the spur. This hole is used, when necessary, to pass a wire ligature through it to enable the molars and premolars to be tied together when a distal tilt of the molar develops during treatment. To construct this spur, a 0.036 gauge wire is annealed and bent to fit the lingual surface of the band about the mesiodistal width of the tooth and parallel to the occlusal about halfway down.

When the wire is shaped, a separating disk is used to slit into the wire about 2 mm. from the mesial end, to the depth of half its thickness (Fig. 2). To

solder the spur to the band, the freehand method can be used, holding the band at the joint with one pair of tweezers (Fig. 3) and holding the prepared wire in the hand by the free long end, after a little 18k solder has been flown on the inside of the spur. The band and spur are held in the flame and carefully caught in the proper position (Fig. 2). The proper position is about halfway down the tooth parallel to the occlusal plane and not too close to the gum. When it is

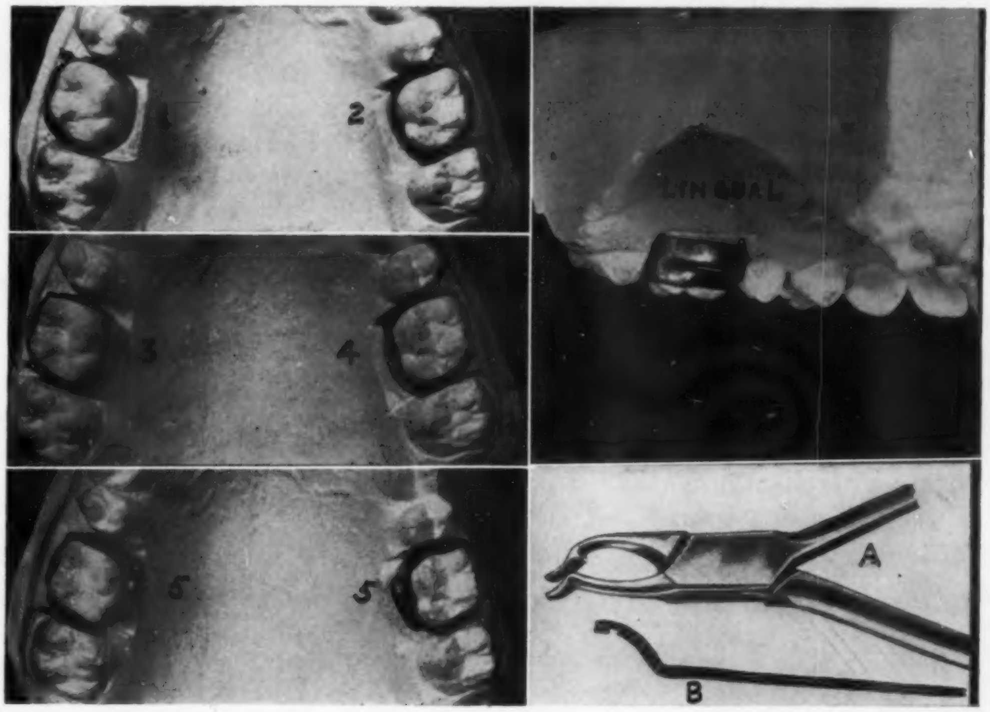



Fig. 2.—Showing successive steps of maxillary molar band preparation with finished lingula spur and mesial hole. *A*, Band-forming pliers, *B*, Wire prepared with slit for lingual spur and mesial hole.

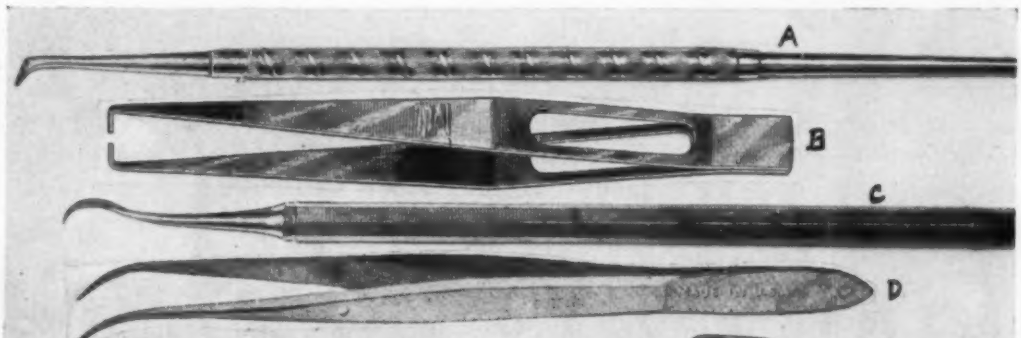



Fig. 3.—*A*, Foot plugger. *B*, Band-soldering tweezers. *C*, Scaler. *D*, Perry pliers. *E*, Soldering tweezers for buccal tubes.

caught, the excess wire is cut away and the soldering is completed with care so as to have the spur caught to the band throughout its length, except where the slit was made for the hole toward the mesial. Another method can be used to solder the lingual spur for the maxillary molars. After the wire is shaped and the mesial slit for the hole made, the excess wire is cut away and the band and spur held in the proper position with a pair of locked tweezers. After proper fluxing, 18k solder is used to join the spur to the band, being careful not to flow solder into the mesial hole.

When the lingual spurs are properly attached to the two molar bands, we are ready for the attachment of the buccal tubes. A tube (preferably of coin gold material) to fit 0.036 gauge wire about 5/16 inch long is used. Its position on the band is very important, but there is no set rule which can be applied in every case. It should be high enough on the band to allow the arch wire to extend out of the tube and touch the premolars at about the crest of the interproximal gingival tissue. Both tubes should be parallel to the occlusal planes of the molars and their slant should be such as to allow both ends of the inserted arch wire to be parallel to each other. Because of the different types of irregularities of the molar and other teeth, deviation from this general plan very often must be made. Experience will tell us how we are to position the buccal tubes, and quite often our treatment can be planned and facilitated by studying their proper position in the individual case.

The soldering of the tube to the band is best done by the freehand method. It takes quite a bit of practice to do this correctly. With an ordinary pair of small Perry college pliers or tweezers (Fig. 3), the band is held in the left hand with the beaks of the pliers covering the soldered joint of the band. The tube is held in the right hand with a pair of specially shaped soldering tweezers (Fig. 3). After a little 18k solder has been flowed on the tube, the band and the tube are held in contact with each other in what is considered the correct position, and soldered together in a properly adjusted flame of the orthodontic flowpipe. The band with the tube soldered to it is placed back on the model and tested with the arch wire to determine whether it is in the correct position. It is usually necessary to resolder the tube a number of times, depending on the experience and skill of the technician, until it is in the desired position according to the specifications mentioned above. A good deal of practice is necessary to do this correctly in as short a time as possible. The tendency is to try some short cut or any other method, but in the long run it is found, after a good deal of experience, that the freehand method is the best because it permits the proper positioning of the tube according to the needs of the individual case.

A good platinum gold wire should be used for this appliance. The type of metal is very important and learning its qualities is necessary. It should have the property of being easily annealed and tempered, and should lend itself to easy and quick soldering of strong joints without seriously affecting the metal. The gauge of the arch wire is 0.036; very seldom 0.038 in large jaws and when second molars are used for bands; and sometimes 0.034 in very small jaws.

The arch should be shaped so as to hug all the teeth near the crest of the interproximal gingival tissue (Fig. 5). It is shaped by freehand bending with pliers of different widths depending on the bends to be made. The irregularity

of the teeth should be followed. A stop spur of 0.020 wire is soldered to allow the arch wire to enter the tube and not pass through it distally. Starting from the left side, the wire is gradually bent and shaped till we reach the right side.

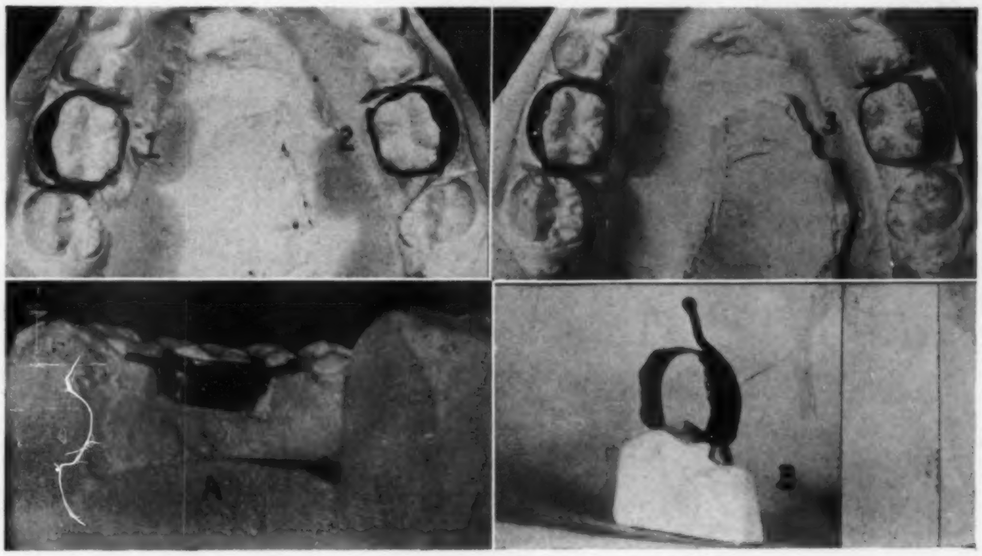



Fig. 4.—Showing successive steps of mandibular molar band preparation. *A*, Lingual view showing soldered joint at distolingual corner and lingual spur with distal and mesial extensions and mesial knob. *B*, Invested band and lingual spur.

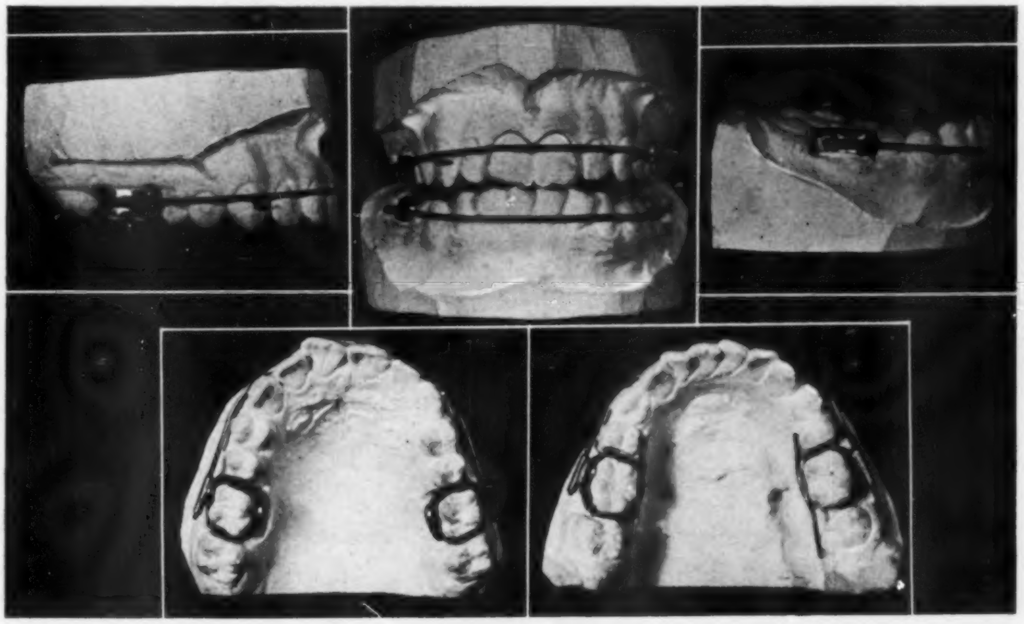


Fig. 5.—Completed maxillary and mandibular appliances.

The proper position of the tubes is checked, and, if necessary, they are resoldered so that both ends of the arch are parallel to each other. Another stop spur is soldered on the right side so as to allow the arch to hug all the teeth as much as possible and lie passively when inserted in both tubes. The molar bands and the arch are then pickled in acid and polished. The appliance is now ready for insertion in the mouth.

The molar bands are checked in the mouth for fit and then cemented in one or two sittings. The arch is also checked for fit and the proper position of the stop spurs. Some adjustment of the arch may be necessary to allow it to lie passively. Assuming that the maxillary teeth are to be treated first, the maxillary arch is inserted and ligated to the teeth to allow the patient to get accustomed to the appliance.

If there is no need for a bite plate, the mandibular appliance is constructed. A good compound impression of the mandibular teeth is taken and a plaster model is poured, allowed to dry, and prepared like the maxillary model for the construction of the molar bands and the arch. In preparing the model for the construction of the mandibular molar bands, the same procedure is followed as for the maxillary molar bands except in the provision made for the room for the beaks of the pliers (Fig. 1). The mandibular molar bands are pinched at the distolingual corners and the plaster is cut away from the mesiolingual corners of the second molars to allow the necessary room for pinching of the band. The distolingual corner of the mandibular molar and the mesiobuccal corner of the maxillary molar are chosen for pinching of the bands because the teeth are the least convex at these respective corners. The mandibular first molars generally have five cusps, three buccal and two lingual. Dents in the cylinder are therefore made at the mesiobuccal, distobuccal, and lingual grooves, as well as at the distal marginal ridge and mesial marginal ridge (Fig. 4). Slits are made at the three buccal cusps and at the mesiolingual cusp, and the edges are overlapped and soldered on the inside with 22k solder, which is also used to reinforce the band on the outside at the mesiobuccal groove, the distobuccal groove, the lingual groove, and the mesial and distal marginal ridges.

When both mandibular molars are finished, the next step is to construct the lingual spurs. The lingual spurs of the mandibular molars are made with extensions distally toward the second molars and mesially toward the second premolars. The gauge of the wire used for the lingual spurs on the mandibular molars is 0.032 inch and the metal is the same as the arch wire. The tip of the wire is balled in the flame and flattened out with a pair of pliers. The flattened knob is placed mesially against the lingual surface of the mandibular second premolar on the plaster model and the wire is bent to hug the premolar just above the gingival tissue. It is further bent to fit the lingual surface of the molar band and then bent to fit the lingual surface of the second molars if present. Because of the irregularities of the molars, it is sometimes necessary to make a double bend mesially and distally to the band so as to keep the mesial and distal extension of the spur parallel to it and the occlusal plane of the first molar (Fig. 4).

The bent wire is waxed in its proper place on the band with a good, hard, sticky wax. The band with the spur waxed to it is carefully removed from the plaster model and invested in plaster so that the distal extension of the spur and distal part of the band are caught in the plaster (Fig. 4). The wax is burned off and the spur is soldered to the band with 18k solder. When the spurs on both mandibular molar bands are completed and properly soldered, we are ready to attach the buccal tubes and shape the mandibular arch to complete the mandibular appliance. The cementation of the bands in the mouth and the insertion and ligation of the mandibular labial arch are done passively at first as with the maxillary appliance.

The mesial and distal extensions of the lingual spurs serve the purpose of distributing the strain on the first molars to the second molars, if present, and the second premolars. The knob at the tip of the mesial extension is used in the same manner as the mesial hole of the lingual spur of the maxillary molar band; that is, to tie the first molar and the two premolars together when there develops a distal drift of the molar during treatment. This is done by twisting a ligature wire around the knob carrying it along the lingual surfaces of the two premolars and through interproximally between the first premolar and the cuspid, and then ligating it to the arch.

## CONSTRUCTION OF THE BITE PLATE

A bite plate is used to correct the deep overbite. In Class II cases the bite plate is worn sometimes before the maxillary arch is inserted and always before the mandibular arch is inserted when there is a deep bite. The lingual spurs of the maxillary molars are purposely constructed without extension arms mesially or distally not to interfere with the bite plate. To construct a bite plate after the maxillary bands are properly cemented, a compound impression is taken of the maxillary arch, being careful to get a good impression of the palate and the lingual surfaces of all of the teeth. A plaster model is poured and dried. In the molar area where the lingual spurs are, the model will be slightly distorted. The occlusal border of the spur should be accurate if the impression is properly taken. With that as a guide, the lingual surfaces of the molars are carved to follow the contour of the tooth, and the casts of the spurs are trimmed flat and scratched out to leave a mark nearly equal to the actual width and length of the spurs (Fig. 6).

The lingual cervical margins of the teeth are trimmed slightly with an inlay carver to sharpen them, especially where they are not clear. When a tooth is slightly lingual or rotated, it is shaved away a bit on the lingual surface to allow the plate to press against the desired spot. Finger springs of 0.026 gauge wire, preferably of the same metal as the arch wire, are shaped for the two centrals and for any other teeth which may be protruding or rotated. When these springs are properly shaped with extensions for attachment to the vulcanite and waxed onto the palatal surface of the model, the waxing of the plate is begun. A horseshoe plate is waxed up. The depth of the bite plate depends on the extent of the protrusion of the anterior teeth. The wax is usually brought up to the occlusal of all teeth and sharp outlines in the margins of the wax are made. This is done to give a clear outline where the vulcanite should terminate and avoid running short at some point when the plate is returned from the laboratory. It is purposely planned to have the laboratory finish it with excess vulcanite around the teeth to allow for final trimming by the individual operator.

When the plate is returned from the laboratory, it is finished off to fit snugly at the necks of all of the teeth and allowed to remain extended to the occlusal at the molars only. With a round bur (No. 2) the grooves for the lingual molar spurs are cut out. If the plaster model has been properly prepared, there will be marks definitely outlined on the plate to represent the position, shape, and size of the spurs. These marks form the guide for cutting the grooves (Fig. 6).

The plate is fitted in the mouth. If properly constructed, it should snap into place and be a little too tight and too snug at first. The finger springs

should be bent to the proper position and the bite plane should cover two-thirds of the maxillary incisors and be leveled out so that all the six mandibular anterior teeth touch it evenly. The patient is then taught how to insert the plate and told to wear it all the time except when eating and cleaning the teeth.

All deep overbites are opened with the bite plate before any attempt is made to expand the mandibular teeth or shift them mesiodistally in Class II cases. If the patient wears the plate faithfully, it should take at most three months to get the desired result. With the judicious use of finger springs, many beneficial changes in the teeth can be accomplished during this time. Spaces can be closed and some teeth can be brought into line without any difficulty. The plate with or without a bite plane has many uses. It is very often used as a retainer for the maxillary teeth when worn only at night for that purpose.

The handling of the labial arch and wire ligatures according to Hellman's technique has been developed over a period of years by careful experimentations and tests of trial and error. Stop spurs are used to expand the arches instead of coil or any other kind of springs. By soldering an additional stop spur of 0.020 wire on the arch to rest against the buccal molar tubes, the arch is lengthened a definite amount each time it is done.

The labial arch, having been originally shaped to the irregularity of the teeth, is gradually straightened out a little each time to conform to an ideal dental arch for the individual case. There are no predetermined arch forms to be followed. The arch form for the individual case is gradually shaped into the appliance, depending on the shape, form, and size of the teeth; and sufficient leeway is allowed for the teeth to align themselves according to their shape, form, and size. At no time is there a drastic attempt made to expand and shape the arch wire to a great extent. It is planned as much as possible to expand or reshape the appliance only enough to stand away just a little from the teeth desired to be brought into position when not ligated, but when properly ligated the spring of the arch wire should allow the arch to be brought into contact with all of the teeth ligated and as many of the rest as desired. In this manner the ligatures are less frequently lost and the action of the appliance is slight and limited.

With sufficient training and practice, the periodic shaping of the arch wire and the careful use of the wire ligatures permit a controlled molding of the dental arches into their proper shape and occlusion. The little inconveniences met with at times in the loosening of some of the wire ligatures become a benefit very often instead of a hindrance. Those wires wrongly applied and exerting too much force will usually loosen or snap. Some teeth that are badly rotated, positioned, or formed may need a band to hold the wire ligature or get the necessary movement. These bands are not numerous and are used with spurs attached to them.

All active treatment is done with the labial arches as described. Intermaxillary elastics are used in Class II cases from hooks soldered onto the labial maxillary arch in the cuspid areas, to the buccal tubes on the mandibular molars; and in Class III cases from hooks soldered onto the mandibular arch in the cuspid areas to the buccal tubes on the maxillary molars. With proper cooperation and proper timing of its institution, active treatment should be completed in

between one and two years. When the desired result is obtained, plans and provisions for retention should be made as soon as possible. When that time comes, a reduction in the frequency of the visits is indicated and a change in the appliance is made.

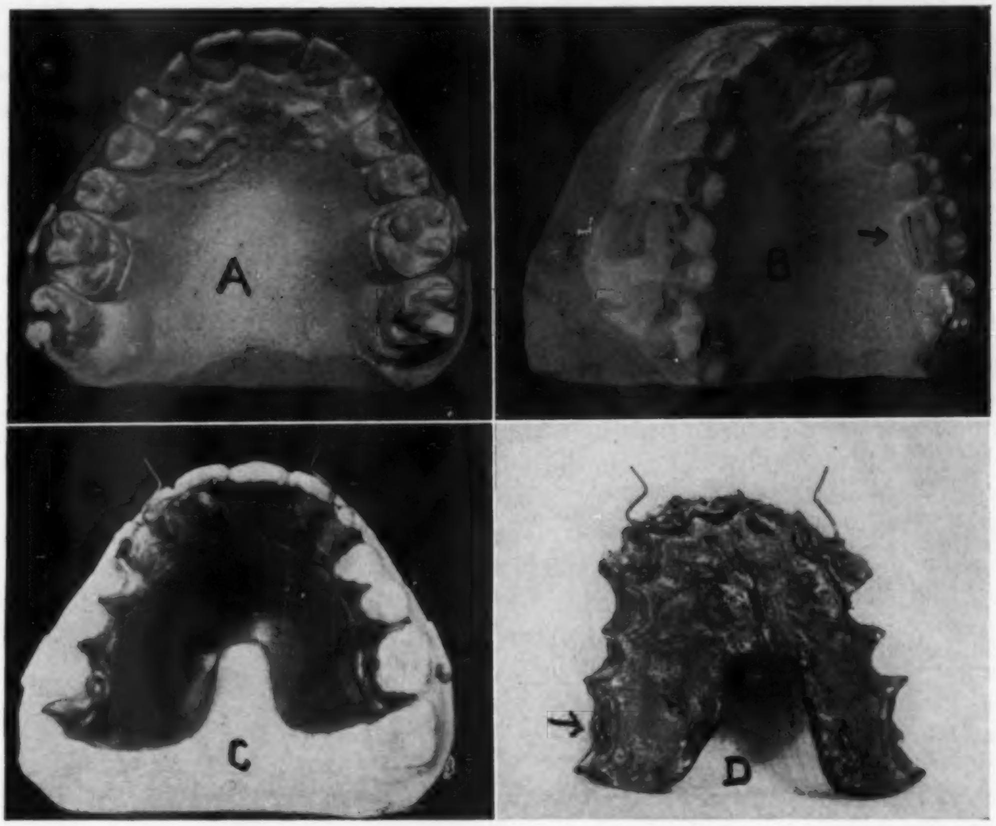



Fig. 6.—*A*, Plaster cast for preparation of bite plate. *B*, Lingual spurs carved in molar bands. *C*, Waxed bite plate with finger springs. *D*, Tissue surface of vulcanized plate returned from laboratory with excessive vulcanite and marks for groove to fit lingual spur. Extensions of finger springs used to stabilize during processing are cut off at this time.

Retention is a very important phase of orthodontic treatment. Much has been written and said about it, but there seems to be considerable misunderstanding. We are all discouraged quite often by a relapse of some of the beautiful results obtained with great effort, yet there are some who claim that retention is not needed. There may be many cases in which the teeth stay where they are put without any steps taken to keep them there. Very often, it is due to the fact that very little changes have been made during treatment, or the resultant positions of the teeth are much more favorable to the normal functioning of occlusion than the original positions, and a relapse is almost impossible. For no known reason, there are many cases which do not relapse in spite of the many changes produced during treatment and every indication that they should. Pernicious habits such as fingernail biting, thumb-sucking, etc., may be a factor; but whatever the cause may be, the problem of retaining the resultant occlusion after treatment is with us and at times very vexing. The majority of cases need careful planning to solve that problem.

Actually, retention is closely linked with treatment. The orthodontic appliance can either be made active or passive. When certain teeth are brought into their proper position, the action upon those teeth is reduced. The proper use of any appliance implies the judicious application of its active forces and the correct timing of the institution of a state of passiveness in all or any part of the appliance. When all of the teeth are brought into their proper position, they remain there only if the appliance is made passive. This state of passiveness is really what we mean by retention. The length of time it is necessary to keep our appliance in the mouth in this state of passiveness to avoid a relapse is the problem we must solve in the individual case. The only way to do this is by the trial and error method. The less machinery we use and the more we reduce that machinery when indicated, the sooner will we be able to determine exactly where in the dental arches there will be a tendency for relapse.

The original appliance can be worn indefinitely and if made passive can act as a retainer. If a good result is obtained without a relapse, after wearing the original appliance a long time, there is no question that in the later stages, the appliance was passive and really used as a retainer. More often it is found that undesirable changes result after the active appliances are removed and that it is usually impossible to hold the active appliance in check for any great length of time. Overtreatment is a common error in orthodontics. Knowing when a good result is obtained and when to stop treatment is very important. To do this, careful control of the appliance is necessary at all times and a gradual reduction in its use should be made. According to Hellman's technique, that principle is followed throughout treatment. Not only are the appliances as simple as possible at the beginning, but, as soon as the desired result is obtained, they are reduced in substance and in the amount of time worn.

## METHODS OF RETENTION

A tendency toward protrusion of the maxillary anterior teeth can be controlled by the insertion of the maxillary labial arch at night with intramaxillary elastics worn from hooks on the arch in the cuspid areas to the molar buccal tubes. The patient can be taught to do this very well and it is a simple method of retention. A plate with finger springs and with or without a bite plane can be worn at night instead to retain such teeth, and very often the plate can be made the final method of retention with a gradual reduction in its use. Badly rotated teeth frequently need bands with spurs to retain them.

The retention of proper mesiodistal relationship after the treatment of Class II cases requires a definite technique. Intermaxillary elastics, having been used during treatment, should never be discarded suddenly. A gradual reduction in their use should be made. From being worn all the time, during active treatment, their use should be reduced to every other day and every night at first, then every night, to be followed by every other night, and so on. The period of retention begins when intermaxillary elastics are worn at night only. At that time it is not necessary to wear the maxillary arch continuously but it can be inserted at night when the intermaxillary elastics are worn. When the maxillary dental arch has been widened and changed from a V-shape or an irregular one to the proper form, a plate with or without a bite plane, according

to the needs, and without any springs or wires, is constructed to fit the lingual surfaces of the teeth snugly and is worn at night only in conjunction with labial arch and the elastics.

To eliminate the use of the wire ligatures on the mandibular teeth a lingual retainer is constructed to replace the mandibular labial arch. Bands, if not already in use, are first made to fit the mandibular cuspids but are not cemented into place. The molar bands are removed and a set of record casts of the mouth is made of the finished case. After this is done, the mandibular cuspid bands are put into place but not cemented and a good compound impression of the mandibular arch is taken, being careful to get a good cast of the lingual surfaces of the teeth. A plaster model is poured without the cuspid bands inserted into the impression. We will then have a cast of the mandibular arch with the form of the cuspid bands in their proper places (Fig. 7). The buccal tubes of the mandibular molar bands and all of the lingual spurs, except the distal extension arms with enough of the spurs attached to the band to keep them in place, are removed. In place of the buccal tubes, intermaxillary hooks are soldered to the bands.

The plaster model is then prepared for the construction of the lingual retainer. The first molars are carefully trimmed and carved to allow the proper placement of the molar bands. When the bands are properly placed, a 0.036 gauge wire is annealed and bent with different width pliers to hug the teeth closely on the lingual surface. Starting with the middle of the lingual surface of the left molar band, the wire is shaped to conform to it but stand away slightly to allow the thickness of a buccal tube to pass through. The wire is kept parallel to the occlusal plane of the molars, then bent to follow the contours of the two premolars. At the cuspid it is shaped to fit the form of the banded cuspid just above the cingulum and then carried across the four incisors just above the cingula in close contact with the lingual surfaces of these teeth. When we reach the mesial of the right cuspid, the wire is bent there and shaped to hug the form of the banded cuspid above the cingulum and then shaped to hug the two premolars until we reach the right molar band. The wire is bent there the same as on the left side to fit the contour of the lingual surface of the right molar band. The wire at the molar is made parallel to the occlusal and slightly away from the band about the thickness of the buccal tube (Fig. 7).

An old buccal tube is cut in half with a separating disk. Each half tube is ground flat with a stone on one side and is to be used as a lingual horizontal tube on the molar bands to receive the ends of the lingual retainer. The small tubes are slid on to the ends of the wire with the flat surface in contact with the bands. The lingual retainer will have to be tested, bent, and shaped carefully so that these horizontal tubes fit closely to the molar bands and the rest of the retainer hugs the lingual surfaces of all the teeth in front of the molars. The bending and shaping of the lingual retainer is done by the freehand method, one tooth at a time, so that it hugs all of the teeth in the desired spots and lies passively with the horizontal tubes in the correct position on the molar bands. (Fig. 7.)

Scratches are then made just in front of the horizontal tubes and, after removing the retaining wire from the model, stop spurs of 0.020 wire are soldered on at these points. At this stage a piece of 0.020 wire about 3 mm. long is

soldered onto the retainer at each cuspid area to thicken the retainer there. It is used for a groove which is made with a separating disk in the proper place behind each cuspid, to receive a spur from the cuspid bands, to fit into it and be bent around the retainer to be locked there. Lingual spurs with arms a little longer than necessary are soldered of 0.020 gauge wire onto the cuspid bands toward the mesial or distal, whichever side of the cuspid it is desired to keep more lingual than the other, depending on what position the tooth originally had. The retainer is then placed back on the model in its proper position and the horizontal tubes slid into place. The tubes are then waxed to the band with a good sticky wax, making sure that the tubes rest close to the stop spurs and the retainer is in close contact with the teeth.

The bands with the horizontal tubes waxed to them in their proper position are carefully removed from the model and preparations are made to solder the tubes to the bands. A wire made of an ordinary straight pin with the head and the point cut off is shaped with a double bend so that one end fits into the tube, rests at the bend without protruding through the other side of the tube, and the other end stands out and away from the band (Fig. 7). The small arm of the wire is used to dip into a soft mix of precipitated chalk and water, and then filled into the lingual tube so that it catches and holds the wire. The long arm of the wire and part of the band are invested in plaster holding the band and the arm in their correct positions. When the plaster is set, it is trimmed to a size just large enough to hold the wire and band without being too bulky (Fig. 7). This is done to enable easy soldering of the band and the tube together without the use of excessive heat. When the wax is burned off, the tube will be held in contact with the band in the proper position by the pin which holds it in place with the set mixture of precipitated chalk and water (Fig. 7). The dried precipitated chalk also prevents the solder from flowing into the lumen of the tube. The soldering is done with 18k solder.

The molar bands with the lingual horizontal tubes soldered to them are placed back on the plaster model with the lingual retainer slipped into the tubes. If all steps have been carefully followed, the retainer will hug the lingual surface of all the teeth in front of the molars when the bands are properly placed home, and the lingual tubes will rest snugly against the stop spurs on the retainer. The whole appliance with the molar bands is then pickled in acid, polished, and made ready to be inserted in the mouth.

The molar bands with the retainer properly inserted in the lingual tubes are placed in the mouth and tested for fit. When the molar bands are properly placed on the molars, the lingual retainer should lie passively and be in close contact with all of the teeth ahead of the molars except the cuspids. The cuspid bands are slipped in under the retainer and placed home on the cuspids. The arms of lingual spurs on the cuspids should rest on the retainer and fit into the grooves which were prepared for them. The cuspid bands are removed and the excess wire is cut off. Enough of the wire is left to be able to coil the spurs around the retainer and in this way lock the retainer at the cuspids. A final check is made and we are now ready for cementation.

The cuspid bands are slipped off the teeth. One molar band is removed from the tooth and the other molar band with the retainer is left in the mouth

to enable the proper placing of the band to be cemented. Before cementing the molar bands on the teeth, one at a time, the lingual tubes are filled with petroleum jelly to prevent any cement getting into them during cementation. The two molar bands having been cemented on the teeth with the retainer properly inserted in the lingual tubes, we are now ready for the cementation of the cuspid bands. This can be done one at a time or both during the one preparation of the cement. Whichever way it is done, the cuspid bands are slipped onto the teeth after they are dried and isolated with cotton rolls. The lingual side of the bands are slipped under the retainer and the arms of the spurs are pressed home into the grooves on the retainer which were made to receive them. When the cement is set, the excess wire of the arms of the spurs is cut away leaving enough of the wire to coil it around the retainer and lock it there.


Fig. 7.—*A*, Cast for preparation of lingual retainer. *B*, Lingual retainer fitted on model. *C*, Lingual retainer with distal extensions and cuspid bands in place as placed in mouth. *D*, Investment of band and waxed lingual horizontal tube for soldering. *E*, Diagram of specially bent pin. *F*, Position of pin in tube.

The principle behind the lingual mandibular $\overline{6|6}$ retainer constructed in this manner is to have it supported by four movable joints at the two molars and the two cuspids. In this way the retainer checks the teeth from any tendency toward relapse, maintains the proper arch form and, if properly constructed, keeps them in their correct positions. The horizontal round tube and the type of joint at the cuspids allow these teeth freedom for individual motion during function and do not splint them in any way. This retainer permits the use of intermaxillary elastics at night to retain mesiodistal relationship after

the treatment of Class II cases. It has been found that no erosion results from the contact of an appliance on the lingual surfaces of the teeth. Because of that and the fact that no wire ligatures are used, it is not necessary to see the patient often. Recementation of bands is planned on a semiannual basis, and during the time when this lingual retainer is worn it is possible to allow the patient to stay away for as long as three months at a time without any bad reactions. The wearing at night of a maxillary arch with intermaxillary elastics, and sometimes a plate with or without a bite plane, is an efficient method of retention for the proper form of the maxillary and mandibular dental arches and the proper mesiodistal relationship of the two arches.

This method of retention can go on with practically no harm for a year or longer, with very few office visits, and then only for the purpose of a checkup or a semiannual recementation of the bands in order to watch for dental caries. The patient wears nothing but the lingual retainer during the day and in some mouths the mandibular cuspid bands are very inconspicuous. The labial arch with intermaxillary elastics and the plate, if used before, are worn only at night and then gradually reduced until it is determined that the mesiodistal relationship will not change. When no plate has been worn, the maxillary labial arch is taken from the patient and after another test is made to determine whether the labial arch will not be necessary, the maxillary moiar bands are removed.

The only concern we have now is whether the mandibular anterior teeth will stay in the desired position. A tendency toward the crowding of these teeth or the slight rotation or overlap of one of them at times is very great. An attempt to retain them a little longer can be made with a simplification of the lingual retainer. Since we are interested now in the anterior teeth only, the retainer does not have to extend from molar to molar and it is therefore removed from the mouth. The cuspid bands with the lingual spurs cut off are fitted back on to the cuspids in the mouth and a compound impression is taken in a small bridge tray. The area in the impression that is necessary to be covered is from the first premolar on one side to the first premolar on the other side. When a good impression of the lingual surfaces of these teeth is taken, the cuspid bands are removed from the mouth and fitted into their proper places in the impression. They are then waxed to the impression and a plaster model is poured and dried. We will then have a plaster model of the mandibular teeth from the premolars on one side to the premolars on the other side with the cuspid bands included in the cast (Fig. 8).

To construct this mandibular cuspid to cuspid or $\overline{3 \mid 3}$ retainer, as it may be called, a 0.032 gauge wire of the same metal as the arch wire is used. After annealing the wire, you start from the distolingual surface of the first premolar to bend it to conform to the lingual surface of that tooth. Another bend is made at the mesial of the premolar and shaped to rest over the cingulum of the band of the left cuspid. The wire is then bent and shaped to rest above the cingula of the incisors until it reaches the mesial of the right cuspid, bent to fit the lingual surface of that banded cuspid, and then shaped to fit the lingual surface of the right first premolar ending at the distal corner of that tooth. This $\overline{3 \mid 3}$ retainer is shaped and tested so that it lies passively and contacts the lingual surfaces of all of the teeth in front of the second premolars. It is then waxed with

a good sticky wax to the lingual surfaces of the cuspid bands it touches. When this is done, a little plaster is applied with a wet brush to secure the retainer at both ends at the premolars, and in the middle at the central incisors (Fig. 8). The invested model is allowed to dry, the wax burned off, and the retainer soldered to the cuspid bands with 18k solder. It is cleaned, pickled, and polished, and made ready for insertion in the mouth. After it is tested in the mouth to see that it fits and makes close contact on the lingual surfaces of all of the teeth in front of the premolars, it is cemented onto the cuspids in one operation.

This retainer can be left in the mouth for an indefinite period to be recemented semiannually, unless any of the cuspid bands loosen in between. This type of retainer is also used in Class I cases to retain the expanded mandibular arch. It is often used in conjunction with a maxillary bite plate and some finger springs attached to it, to prevent a return to a deep bite and the protrusion of certain anterior teeth. Worn every night at first and then less and less, the plate becomes a final stage of retention.

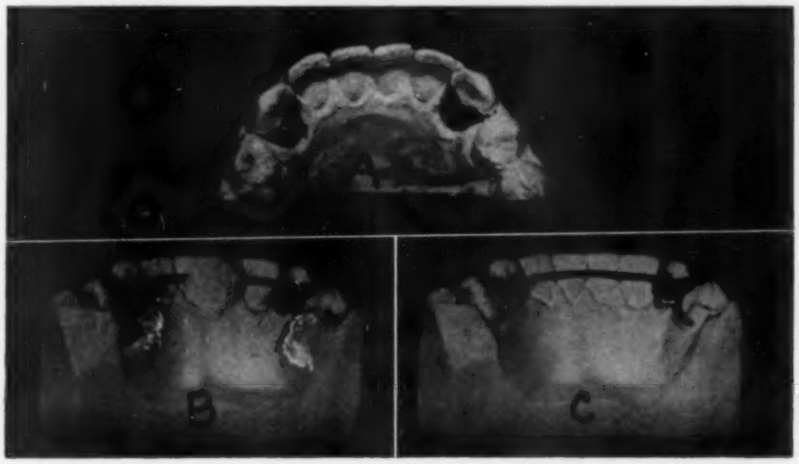



Fig. 8.—*A*, Cast for $\overline{3|3}$ retainer with cuspid bands in place. *B*, Fitted lingual retaining wire waxed to bands and invested in plaster. *C*, Finished $\overline{3|3}$ retainer soldered at cuspid bands.

## SOME TREATED CASES

The following cases are part of the regular office routine and have been treated with the labial appliances in the manner described. They have been chosen only to make up a varied assortment of different types of cases. They all presented individual problems which had to be met, sometimes with considerable difficulty.

Case 1.—J. M. (Fig. 9), girl, aged 9 years, 8 months, 4 days, was a Class II, Division 1 with a very deep overbite. There was also an impacted and unerupted maxillary left second premolar. The dentition was very much advanced. The stage of dental development was III C (beginning of eruption of the second molars). This patient presented a serious problem of nail-biting. Wire ligatures were lost frequently during treatment. Very often, all of the ligatures were lost between visits, and on different occasions the patient was made to visit

the office every other day in order to retain the ligatures and finish the case for retention. Still the ligatures continued to be lost. In spite of all this difficulty, after about two years of treatment, the result shown (Fig. 10) was accomplished. Retaining of the result in this case presented no difficulty after following out the regular routine.

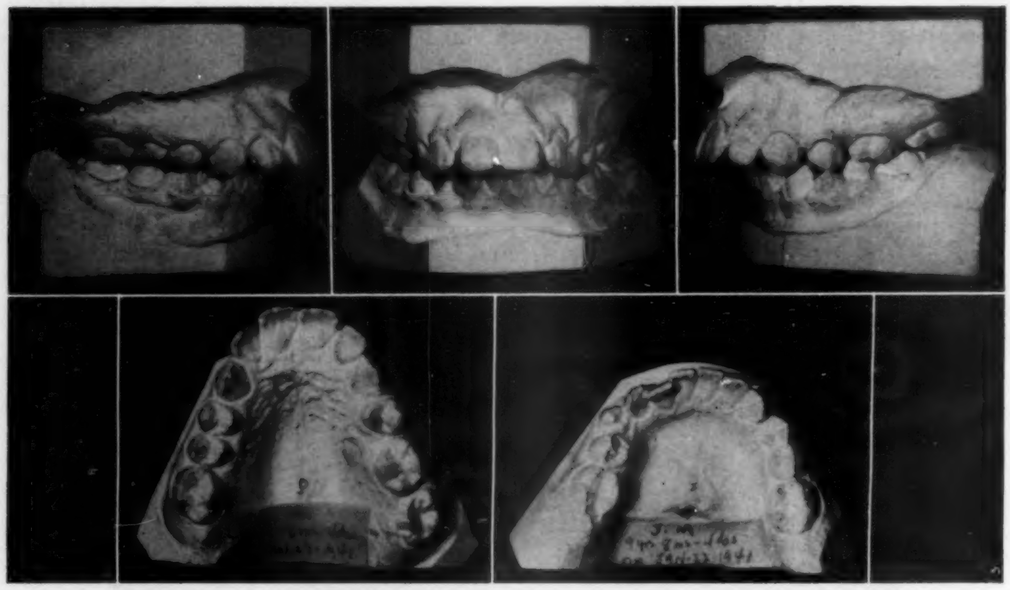


Fig. 9.—Case 1. J. M., girl, aged 9 years, 8 months, 4 days. Class II, Division 1, before treatment.

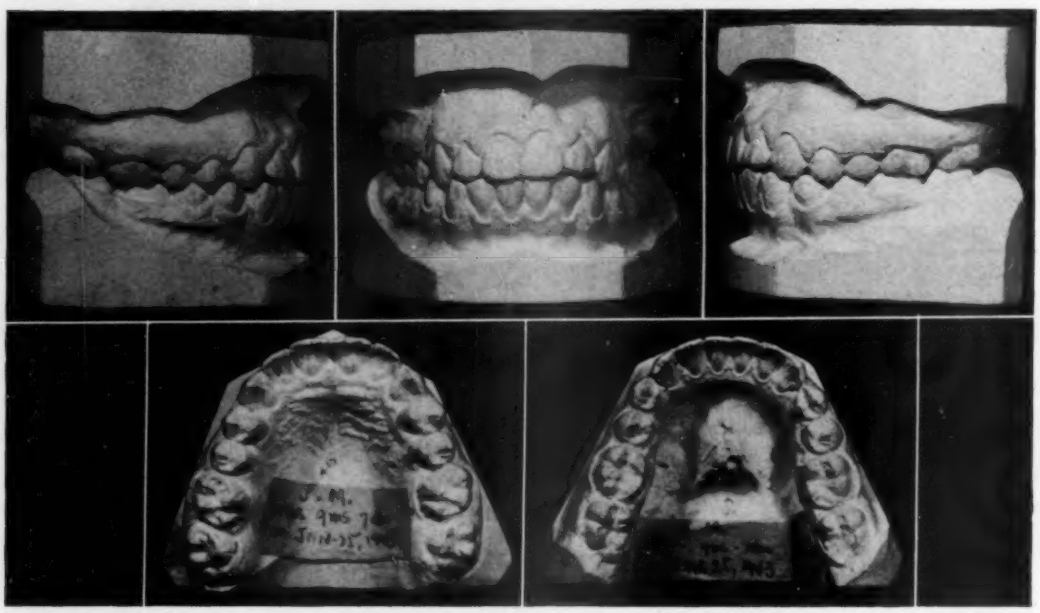


Fig. 10.—Case 1. J. M., aged 11 years, 9 months, 7 days. After treatment, two years later.

Case 2.—M. H. (Fig. 11), boy, aged 10 years, 11 months, 15 days, was a Class II, Division 1 with a deep overbite. The stage of dental development was III B, about normal for this age. Treatment was started a little earlier than

usual (stage III C is preferred for males). This was done to open the deep bite with a bite plate before the patient was to leave for camp during the summer. After wearing the plate all the time except when eating and cleaning the teeth, the bite was kept open during the summer by the bite plate being worn during

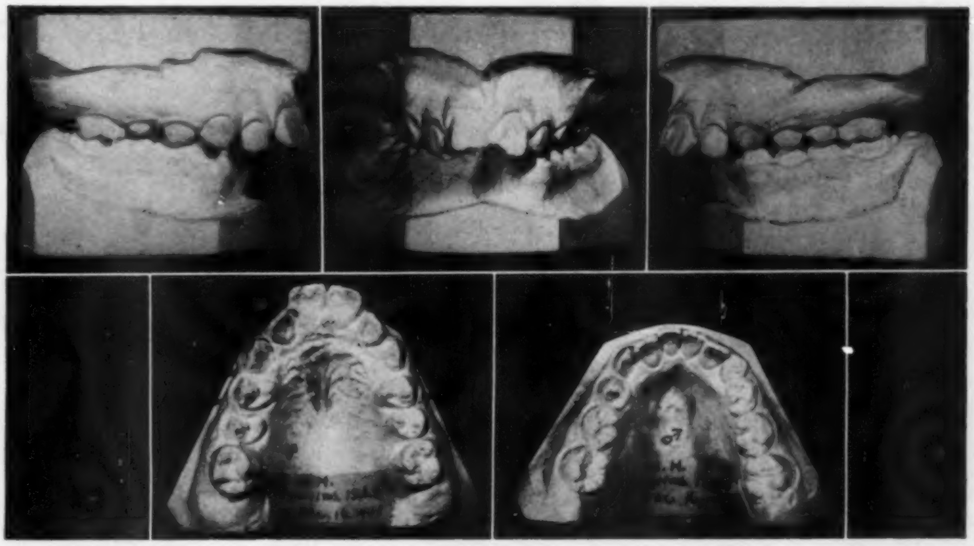


Fig. 11.—Case 2. M. H., boy, aged 10 years, 11 months, 15 days. Class II, Division 1, before treatment.

Fig. 12.—Case 2. M. H., aged 12 years, 4 months, 19 days. After treatment, one year and five months later.

the night only. When the patient returned in September, the mandibular and maxillary labial arches were inserted, and active treatment was completed the following May, after one year and five months of treatment (Fig. 12). At this stage retention was started. Maxillary cast shows molar bands with buccal tubes for reception of the maxillary labial arch, to be worn at night with intermax-

illary elastics. A mandibular $\overline{6 | 6}$ lingual retainer was inserted as shown in Fig. 7. No problem of retention presented itself in this case.

CASE 3.—Z. M. (Fig. 13), girl, aged 14 years, 1 month, 4 days, was a Class II, Division 1 with a deep overbite. The dental developmental stage was IV A. This case was complicated by the buccal position of the maxillary right second molar and the lingual position of the maxillary left first molar. Active treatment was completed in about one year and four months (Fig. 14). The man-

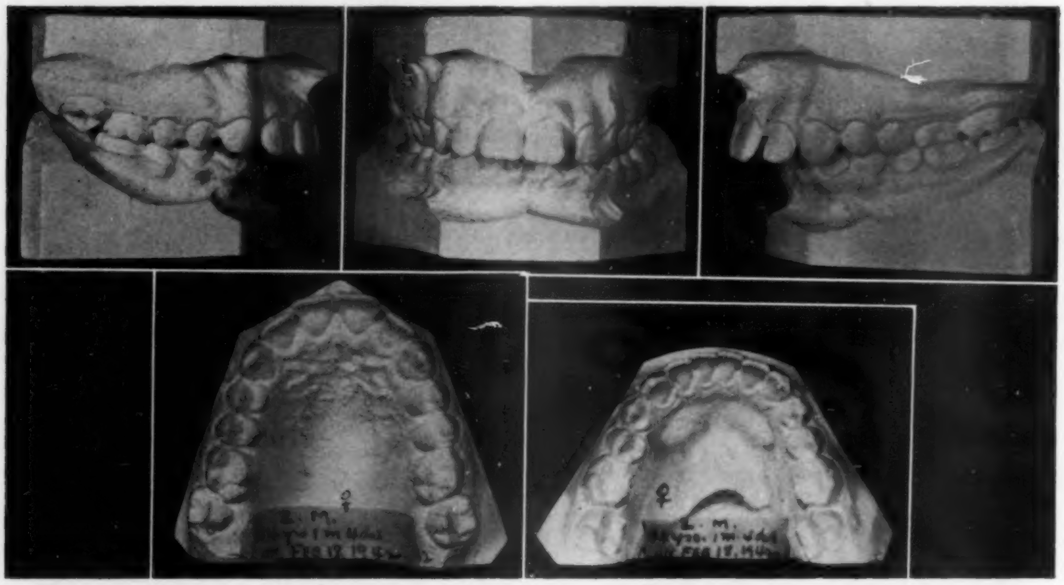


Fig. 13.—Case 3. Z. M., girl, aged 14 years, 1 month, 4 days. Class II, Division 1, before treatment.

Fig. 14.—Case 3. Z. M., aged 15 years, 5 months, 11 days. After treatment, one year and four months later.

dibular casts show the $\overline{6 \mid 6}$ lingual retainer in position. Retention in this case gave no trouble.

CASE 4.—R. W. (Fig. 15), boy, aged 13 years, 2 months, 26 days, was a Class II, Division 2 with deep overbite. Dental development was in late stage of III B with no second molars yet erupted and quite retarded for this age. Active treatment was completed in about ten months at stage III C (the mandibular molars just beginning to erupt) (Fig. 16). A long period of retention was necessary in this case.

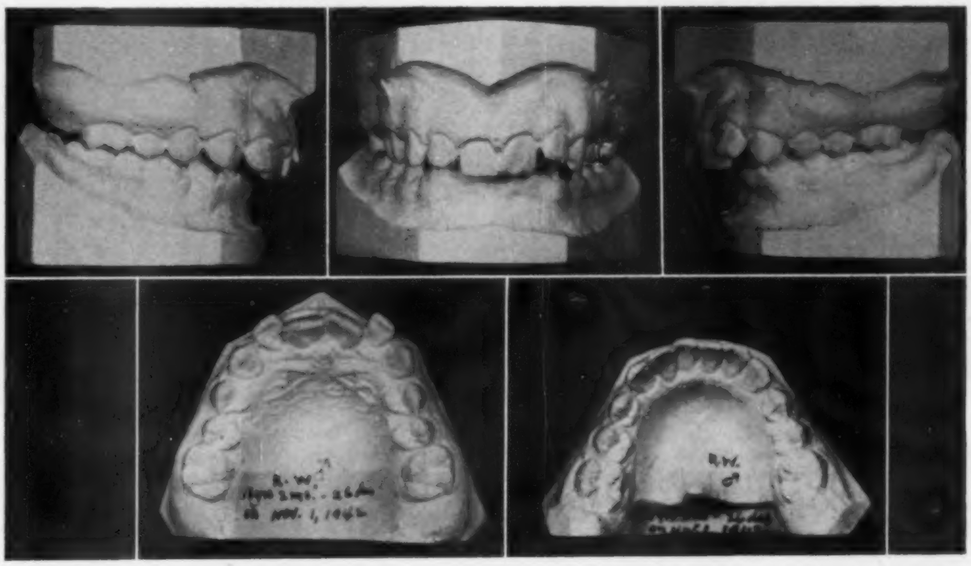


Fig. 15.—Case 4. R. W., boy, aged 13 years, 2 months, 26 days. Class II, Division 2, before treatment.

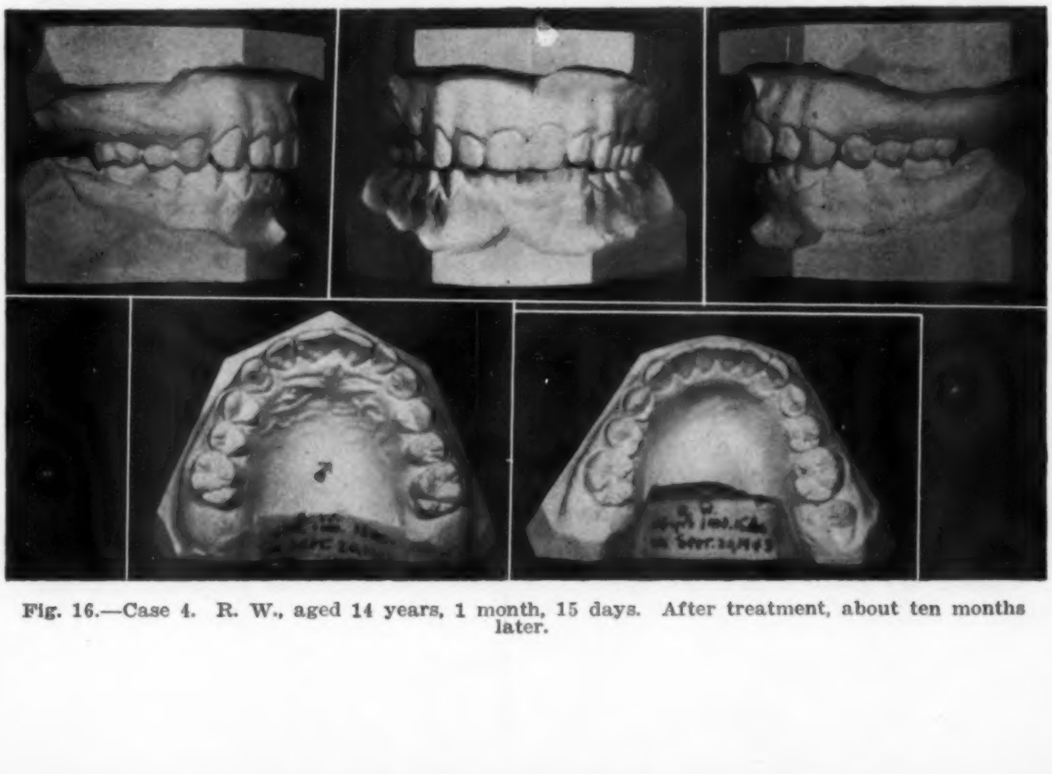


Fig. 16.—Case 4. R. W., aged 14 years, 1 month, 15 days. After treatment, about ten months later.

Case 5.—A. Z. (Fig. 17), girl, aged 16 years, 9 months, 12 days, was a Class III with a completed dentition with the dental developmental stage of IV A. Note spaces between maxillary centrals and between left maxillary cuspid and left maxillary first premolar. This case was treated before for six years by

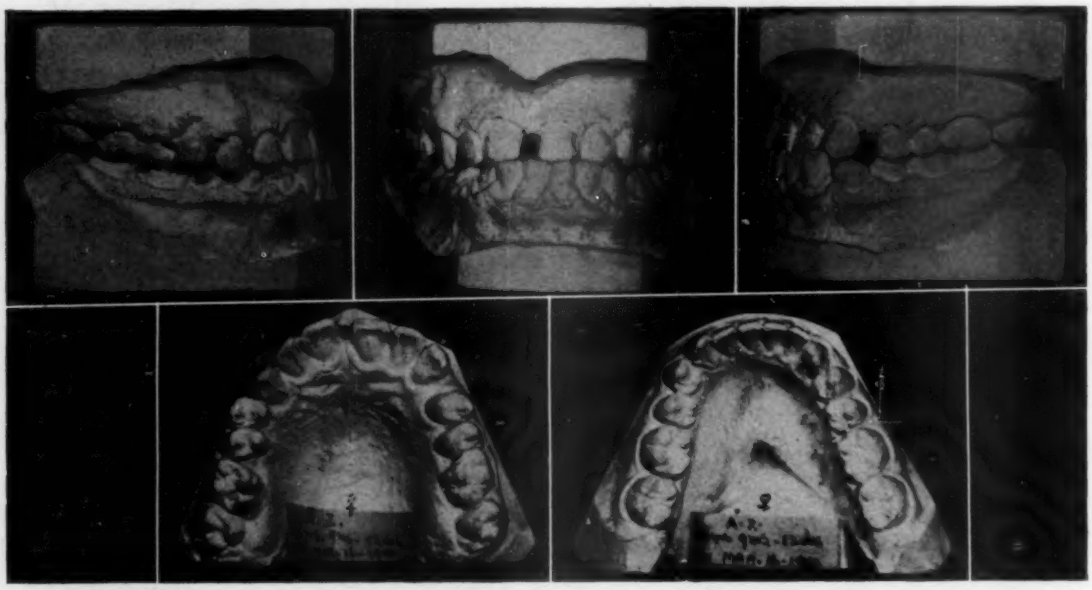


Fig. 17.—Case 5. A. Z., girl, aged 16 years, 9 months, 12 days. Class III, before treatment.

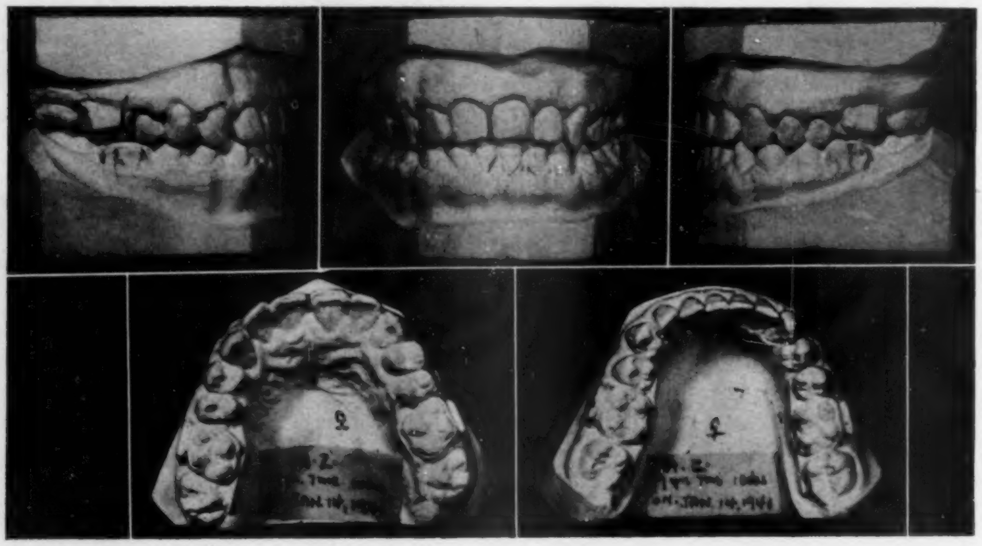


Fig. 18.—Case 5. A. Z., aged 17 years, 7 months, 10 days. After treatemnt, about eleven months later.

another orthodontist. Fig. 18 shows case after about eleven months of treatment. Spaces have been closed. Proper mesiodistal position has been established and retention was maintained at first by the insertion of the arches at night with intramaxillary elastics and Class III intermaxillary elastics. Later a maxillary plate with finger springs on central incisors was worn at night only for retention.

CASE 6.—R. F. (Fig. 19), girl, aged 13 years, 9 months, 29 days, was a Class I with Class III tendency. Dental developmental stage was late III C with mandibular left second molar not yet erupted. This case was undertaken with considerable hesitation. There was a marked tendency toward caries.

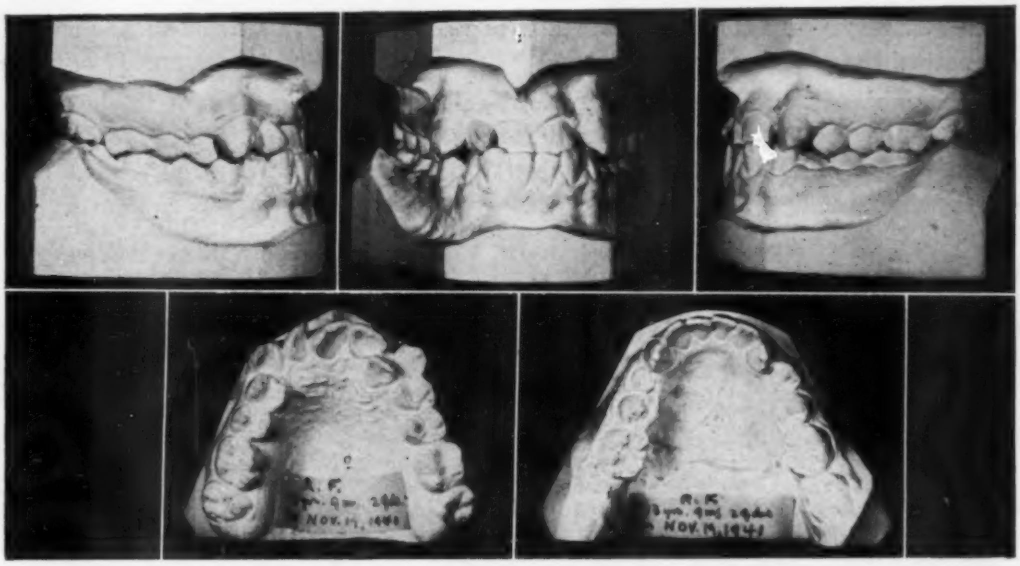


Fig. 19.—Case 6. R. F., girl, aged 13 years, 9 months, 29 days. Class I, with Class III tendency, before treatment.

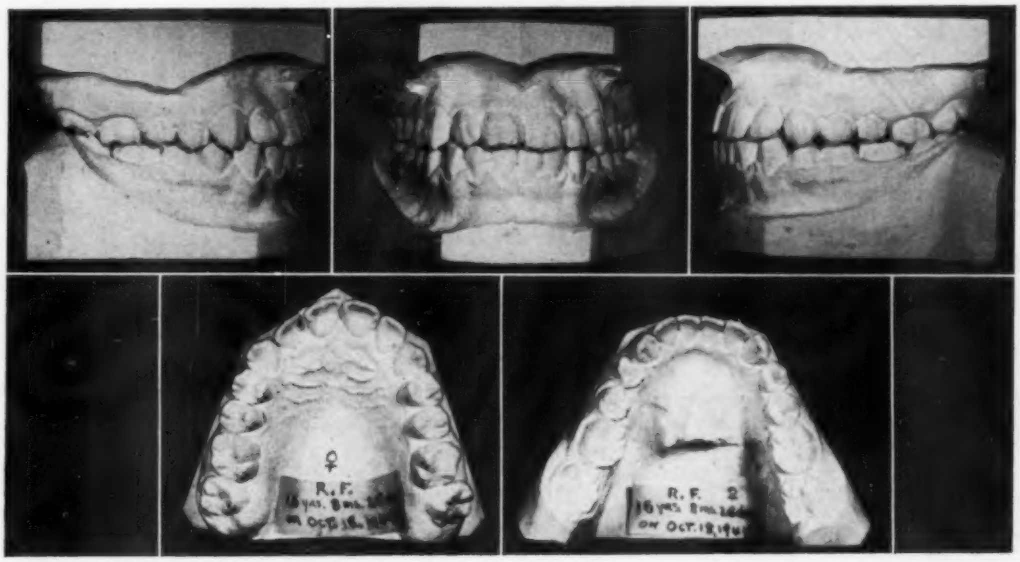


Fig. 20.—Case 6. R. F., aged 16 years, 8 months, 28 days. After treatment, about three years later.

The molars had large fillings, and the lack of basal bone for the amount of available tooth structure was very discouraging. It was felt that considerable care to avoid damage to the teeth was necessary in this case and frequent rest periods were indicated. This case was treated with the same type of appliances, and Fig. 20 shows the result after about three years of treatment during which time there were frequent rest periods of about three months' duration for necessary

dental repairs. Note lingual position of maxillary left first molar locked in the mandibular left second molar which erupted buccally. This condition will be corrected.

To avoid drifting away from the main purpose of this paper, photographs of the face have not been shown. The esthetic effect, however, in each of these cases was very gratifying. A discussion of this phase of treatment will be made at another time.

The objectives of this paper were as follows: (1) To attempt to clear up some of the confusion that exists in orthodontic technique. (2) To demonstrate what could be done with simple appliances. (3) To make a plea for simplification of appliance construction.

I wish to express my deep gratitude to Dr. Milo Hellman not only for his help and advice in the preparation of this paper, but also for the opportunities he has freely given me at all times to draw from his vast knowledge of clinical experience in orthodontics and his extensive research in dental development and facial growth.

REFERENCES

1. Hellman, Milo: Changes in the Human Face Brought About by Development, INT. J. ORTHODONTIA 13: 475, 1927.
   Idem: Growth of the Face and Occlusion of the Teeth in Relation to Orthodontic Treatment, INT. J. ORTHODONTIA 19: 1116, 1933.
   Idem: An Introduction to Growth of the Human Face From Infancy to Adulthood, INT. J. ORTHODONTIA 18: 777, 1932.
2. Brodie, A. G.: Cephalometric Appraisal of Orthodontic Results, Angle Orthodontist 8: 261, 1938.
   Idem: Does Scientific Investigation Support the Extraction of Teeth in Orthodontic Therapy? AM. J. ORTHODONTICS AND ORAL SURG. 30: 444, 1944.
3. Broadbent, B. Holly: The Orthodontic Value of Studies in Adolescent Growth. In: Physical and Mental Adolescent Growth, Proceedings of the Conference on Adolescence, 37-39, Cleveland, 1930.
   Idem: Measurement of Dentofacial Changes in Relation to the Cranium. In: Practical Orthodontics by Dewey-Anderson, ed. 6, St. Louis, 1942, The C. V. Mosby Co., pp. 210-231.
   Idem: Ontogenetic Development of Occlusion. In: Development of Occlusion; U. of Penn. Bicentennial Conference, 31-48, Philadelphia, 1941, University of Pennsylvania Press.
4. Krogman, Wilton Marion: Racial and Individual Variations in Certain Facio-Dental Relationships, J. Dent. Research 14: 277, 1934.
5. Todd, T. Wingate: Hereditary and Environmental Factor in Facial Development, INT. J. ORTHODONTIA 18: 799, 1932.
   Idem: Prognathism: A Study in Development of the Face, J. Am. Dent. A. 19: 2172-84, 1932.
6. Oppenheim, A.: Biologic Orthodontic Therapy and Reality, Angle Orthodontist 6: 69, 1936.
7. Hellman, Milo: An Interpretation of Angle's Classification of Malocclusion of the Teeth, Supported by Evidence From Comparative Anatomy and Evolution, Dental Cosmos, April, 1920.

57 WEST 57TH STREET

# PREVENTION AND ALLEVIATION OF DEVELOPING CLASS III MALOCCLUSION

Ulysses Erdreich, D.D.S., Poughkeepsie, N. Y.

IN THIS paper we present three case reports of patients treated at the Orthodontic Clinic of Columbia University. The cases are characterized by a linguoversion of the maxillary incisors in relation to the mandibular incisors and by a forward positioning of the mandible. None of these cases could be classified as typical Class III malocclusions, which exhibit an inherent overgrowth of the mandible. They are more correctly classified under what Fisk[1] calls the "atypical" type which "includes in some cases diminished maxillary growth and in others a protrusion of the mandible for convenience." In these cases, the retarded maxillary growth was confined to the incisor region.

The mechanical therapy used in each case was a lower acrylic bite plate with an inclined plane extending over the incisal surface of the mandibular incisor teeth and running downward and anteriorly. The success in treatment varied, and that is what makes these cases and the original diagnoses of value.

In using the Simon gnathostatic method, we are less interested in comparing the cases with the norms established by Simon than in determining where the changes occurred in the relation of the teeth to the jaws and in the relation of the maxilla and the mandible to each other and to the head. To illustrate these changes, we present photographs of the gnathostatic casts, and photostatic profile photographs of the patients.

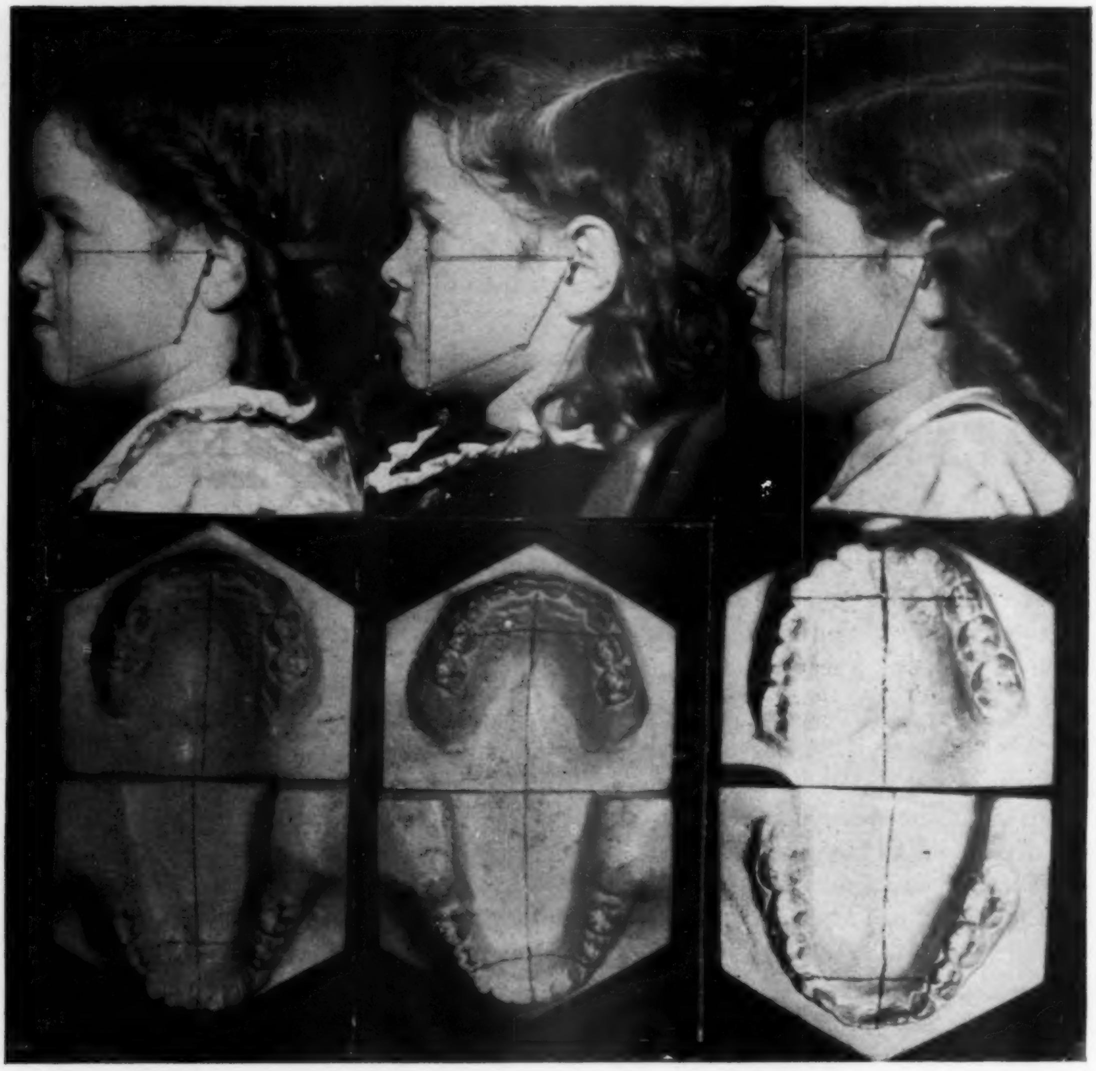
Case 1.—The patient was exactly 5 years old. The medical history showed that the patient had been a full-term, 8 pound, 2 ounce baby at birth, and had been breast fed for nine months. She had experienced the following childhood diseases: measles, chicken pox, and whooping cough. The tongue was large in size, ovoid in shape. All the deciduous teeth were present and were normal in size and structure. Muscle tonicity was good. The head form was mesocephalic, the facial type mesoprosopic. Caries index was low.

There were five other children in the family, all of whom, like the patient, were small in stature. Two of these children had Class III malocclusion. Both parents had prominent mandibles, but did not have Class III malocclusions. With these family characteristics in mind, treatment was started.

Hellman,[2] Todd,[3] and Waugh[4] agree that the period between completion of the deciduous dentition at 3 years of age and the beginning of the eruption of the first permanent molars at 6 years is one of rapid jaw development, and especially of anteroposterior growth. The direction of growth could very easily be channeled incorrectly at this time, and especially so in this case where the mandible, though not overgrown, protruded abnormally. Therefore, treatment at this age seemed called for although it was realized that a relapse might occur during a later stage of growth.

Read at the fall meeting of the New York Society of Orthodontists, Nov. 13, 1944.

The patient wore the appliance for one month, during which time the upper incisors assumed a normal relationship with the lowers, and the occlusal relation of the posterior teeth also improved. The photographs show the case just before treatment at 5 years of age, six months after treatment was completed, and again at the age of 7 years, 4 months. No retainers were used and no muscle exercises were recommended.



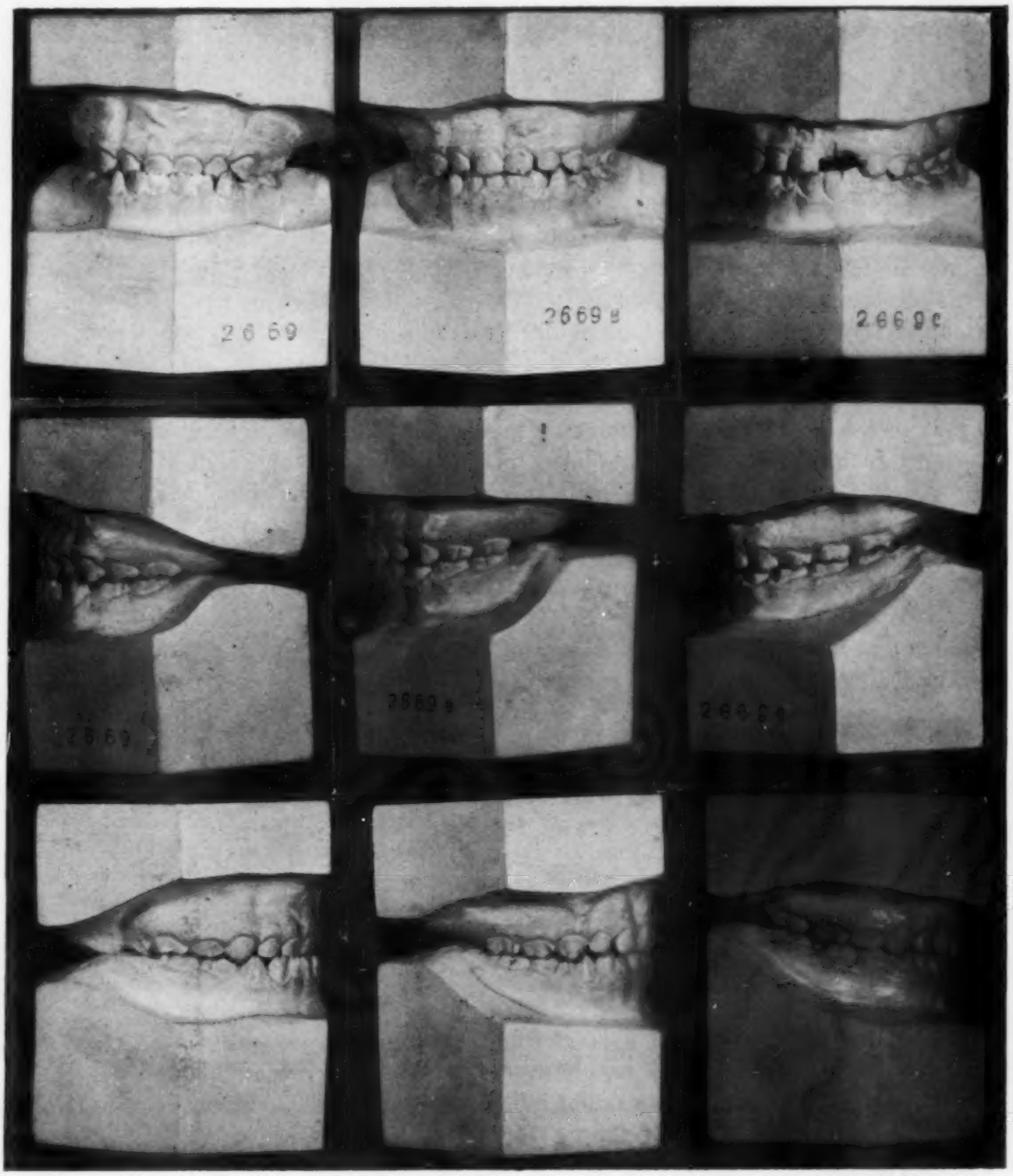
A. B. C.

Fig. 1.—Case 1. Occlusal and profile views. *A*, Before treatment (at the age of 5 years); *B*, Six months after completion of one month's treatment; and *C*, at the age of 7 years, 4 months.

Before treatment, there existed an extreme mandibular protraction in relation to the orbital plane. After treatment, the protraction still existed but to a lesser degree. At the age of 7 years, the mandible was still holding its position. The profile has improved because the mandible moved distally to a more normal relationship with the maxilla, and the occlusion has benefited thereby.

The maxillary anterior teeth, which were in linguoversion to the lower anteriors, returned to normal occlusion. It was encouraging, too, to see that at the age of 7 years, the permanent lower central incisors had erupted into correct occlusion.

The relation of the dentures to the orbital plane was as follows: in the maxilla, the distance from the orbital plane to the prosthion increased from 9.5




A. B. C.

Fig. 2.—Case 1. Front and lateral views. *A*, Before treatment (at the age of 5 years); *B*, six months after completion of one month's treatment; and *C*, at the age of 7 years, 4 months.

to 10.5 mm.; this was not disappointing because neither the maxilla itself nor the incisal segment of the maxilla was originally much underdeveloped, if at all. The extreme protraction of the lateral segment remained the same. In the relation of the orbital plane to the mandibular segments, the total extreme protraction changed to a mild protraction. This is evident on the profile photographs and is demonstrated by the fact that the orbital plane is nearer to the incisors. At the age of 7 years, the relation of the dentures to the orbital plane had changed very little. In the relation of the lateral halves of the dentures to the median plane, the width of the arches remained the same, but in the mandible the median plane, which ran through the right central incisor before treatment, ran between the central incisors after treatment. This indicates that the mandible, which was off center and to the left, shifted to the right into correct position. At the age of 7 years, the mandible continued to shift slightly to the right because the median plane passed through the left central incisor. The occlusion, however, remained normal. The cusps of the deciduous second molars interdigitated normally after treatment. At 7 years of age, the permanent first molars which had erupted by this time, also occluded correctly. In the relation of the dentures to the horizontal plane, no significant changes occurred.

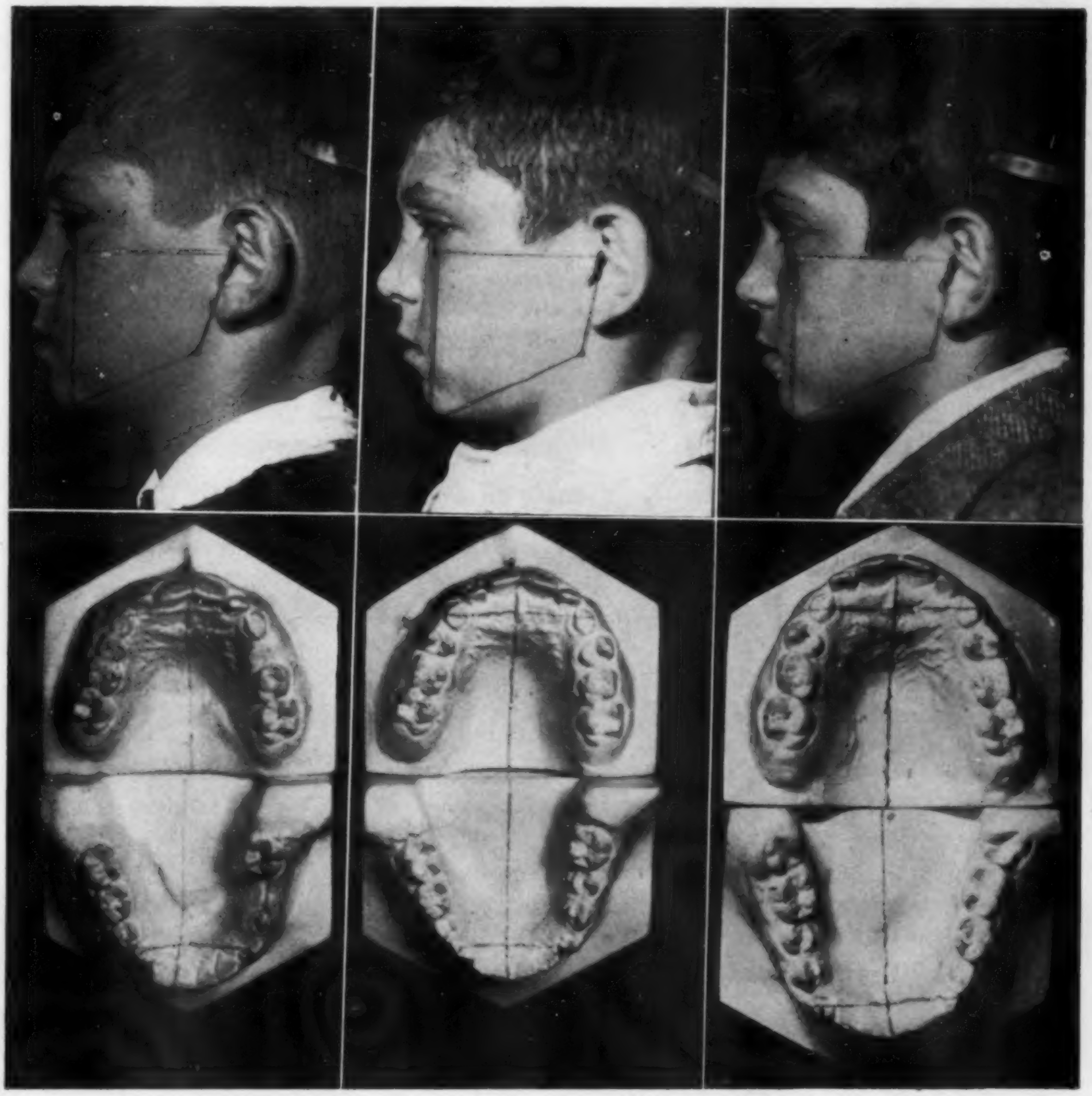
The familial characteristic of the prominent jaw cautioned us to watch the patient carefully. Last week the patient, now 7½ years old, made her periodic visit to the clinic. The maxillary permanent central incisors were found to be erupting lingually to the mandibular permanent central incisors. But the occlusal relation and the relation of the mandible to the maxilla were normal. Treatment will now be required to stimulate labial movement of the maxillary central incisors. For more than two and a half years, the patient has had the benefit of normal occlusion, proper mastication, improved facial appearance, and the manifestation of abnormal mandibular growth has been retarded. These advantages seem to outweigh the arguments against early treatment of a potential Class III malocclusion of this type.

CASE 2.—The patient was 11 years and 3 months old. Medical history revealed that the patient had been a full-term, 8 pound, 8 ounce baby at birth, and had been breast fed for six months. He had had three childhood diseases: whooping cough, measles, and scarlet fever. His tonsils and adenoids had been removed when he was 8 years old. His weight was normal for his height. The tongue was normal in size, ovoid in shape. Muscle tonicity was fair. In this mixed dentition, the teeth were normal in size and structure. The head form was mesocephalic, the facial type mesoprosopic. Caries index was low. There were two other children in the family, neither of whom had a malocclusion similar to this.

The forward positioning of the mandible, far in advance of the Class I centric relation shown on the gnathostatic casts, did not augur well for the future occlusal relation unless immediate steps were taken to correct the lack of growth in the anterior region of the maxilla.

The appliance was worn for five months. At the end of four months, the patient developed an open-bite. The inclined plane was reduced and the patient was instructed in the masseteric exercise. The patient returned in one month. By that time, the bite closed and the occlusion was then normal.

The photographs show the case before treatment at the age of 11 years and 3 months, five months later when treatment was completed, and again at the age of 12 years. In the relation of the mandible to the orbital plane, the mandibular protraction changed to a mandibular retraction; in the 12-year profile, the retraction decreased and the esthetic relation of the mandible to the rest of the head improved.

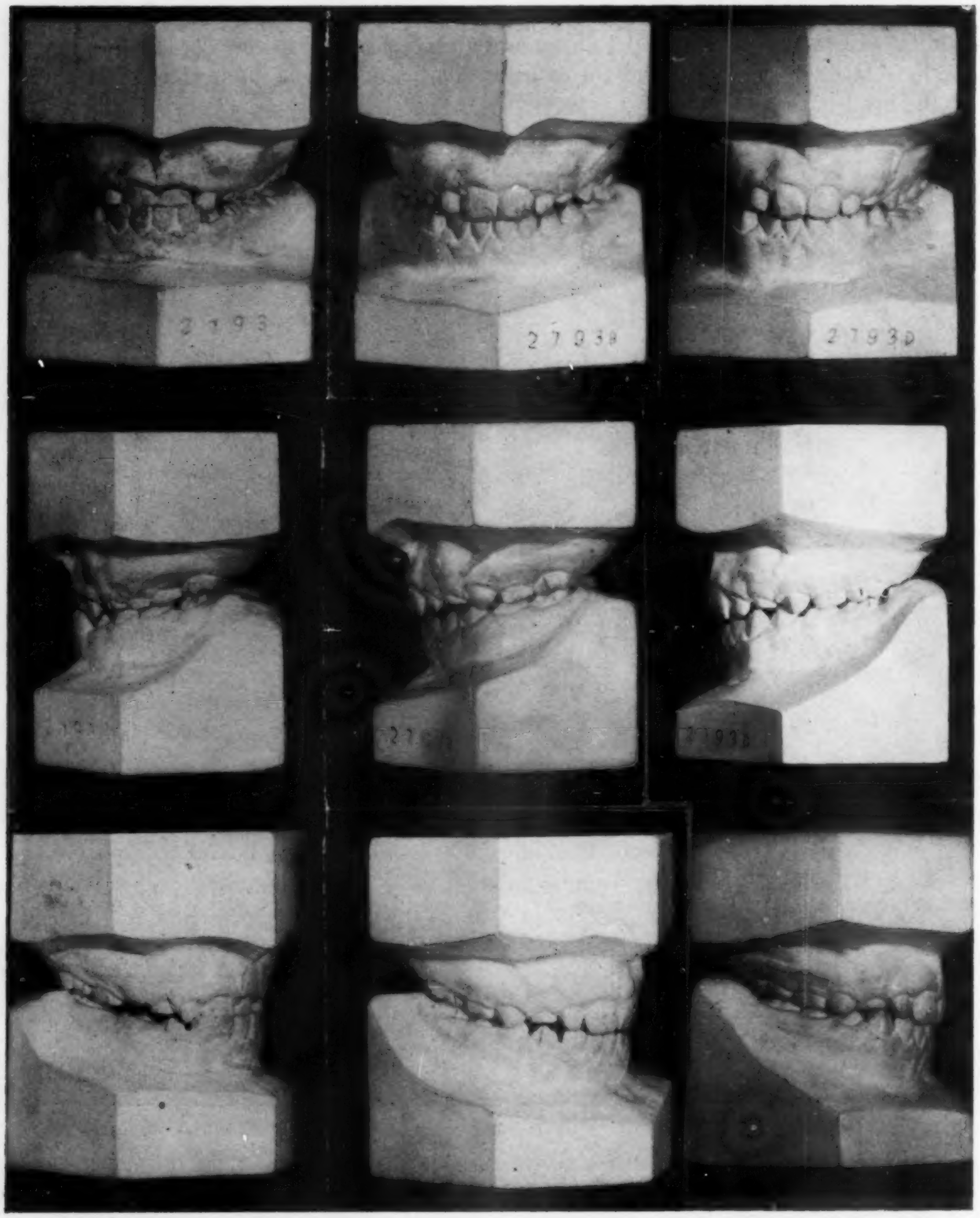


*A.* *B.* *C.*

Fig. 3.—Case 2. Occlusal and profile views. *A*, Before treatment (at the age of 11 years, 3 months); *B*, at completion of treatment, five months later; and *C*, at the age of 12 years.

The upper incisors, which occluded lingually to the lower incisors before treatment, have been stimulated to move forward into normal occlusion and have continued to remain so.

In the relation of the dentures to the orbital plane, there has been a forward movement of the incisal and lateral segments of the maxilla. The mild




A. B. C.

Fig. 4.—Case 2. Front and lateral views. *A*, Before treatment (at the age of 11 years, 3 months); *B*, at completion of treatment, five months later; and *C*, at the age of 12 years.

incisal retraction has become a mild incisal protraction, for the distance from the orbital plane to the prosthion has increased from 3 mm. to 8.1 mm. Thus the appliance has apparently stimulated a forward movement of the maxillary incisors. The extreme lateral retraction has become a normal relation on the left side and a mild lateral retraction on the right side. Four months later, the incisal and lateral segments of the maxilla remained the same except for the mild lateral retraction, which has become normal.

Significant changes have occurred in the relation of the mandibular teeth to the orbital plane. The medium incisal retraction on the right side remained the same, but the left side changed to a mild incisal retraction. The medium lateral retraction on the right side remained but the left side became a mild lateral retraction. Four months later, the mandibular retraction decreased, thus enhancing the appearance of the patient's profile. There was a total mild retraction of the incisal and lateral segments.

In the relation of the lateral halves of the dentures to the median plane, the width of the arches remained the same. In the mandible the median plane which passed through the distal of the right central incisor before treatment, passed through the mesial of that tooth after treatment. This indicated that the mandible, which was slightly off center and to the left, has shifted to the right into a more correct occlusal relation. Four months later, the mandible continued to shift slightly to the right, for the median plane can be seen to run through the mesial of the left central incisor. The occlusion, however, is holding.

The lateral views show that the molar relation was normal and has continued so.

The relation of the dentures to the horizontal plane showed no significant changes.

It remains to be seen whether the occlusion will continue normal after the last of the deciduous teeth are shed and their permanent successors erupt.

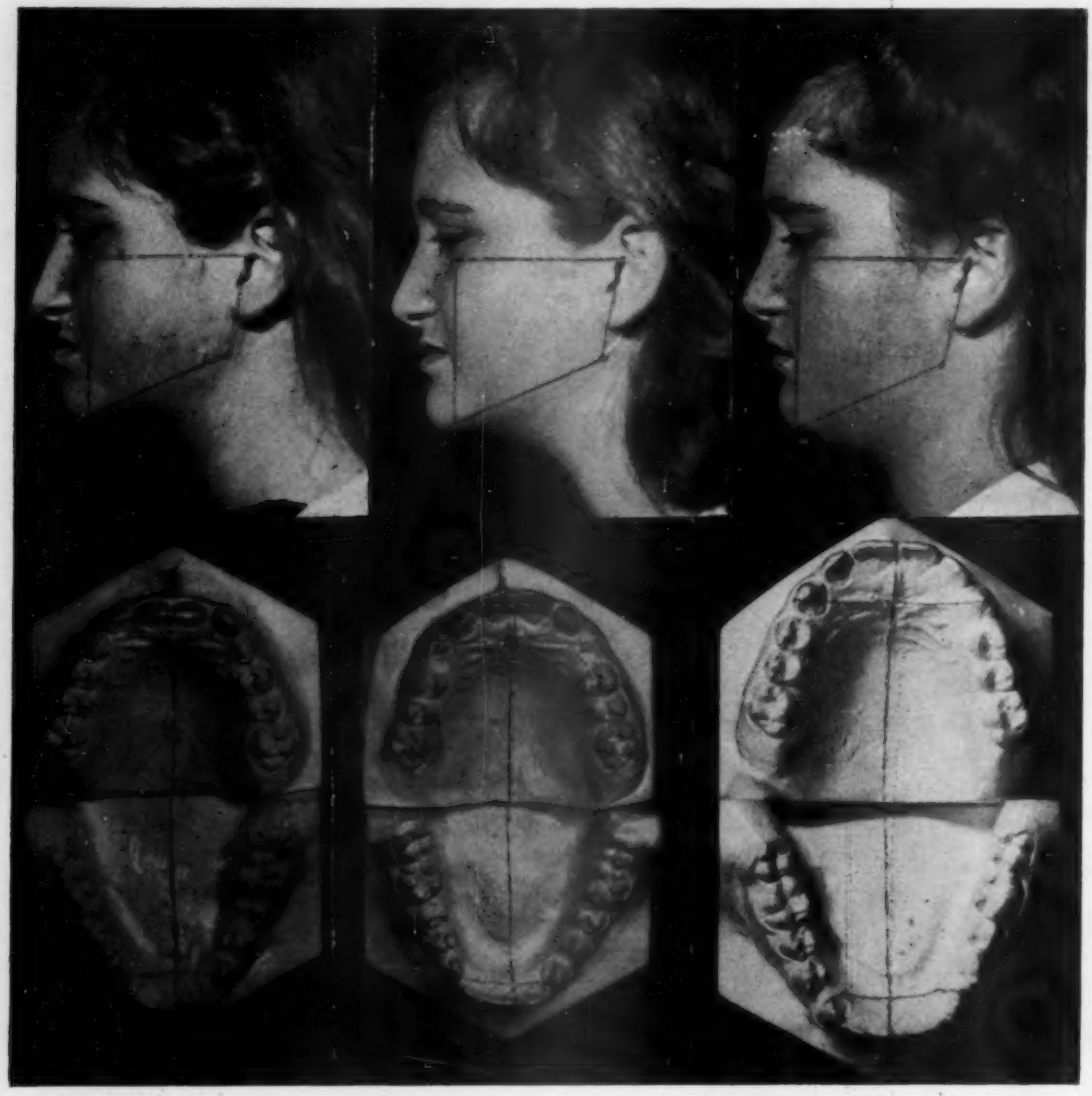
CASE 3.—The patient was 10 years, 9 months old. Medical history revealed that she had been a full-term, 6 pound, 10 ounce baby at birth and had been breast fed for nine months. She had had the following childhood diseases: scarlet fever, chicken pox, whooping cough, and measles. Her tonsils had been removed when she was 8 years old. The tongue was normal in size, ovoid in shape. The teeth were normal in size and structure; of the deciduous dentition, only the upper cuspids remained. Muscle tonicity was good. The head form was mesocephalic, the facial type mesoprosopic. The only other child in the family had normal occlusion. The patient wore the appliance for three months, at the end of which time the teeth were in correct occlusion.

The photographs show the patient at 10 years, 9 months, just before treatment; three months later when treatment was completed; and six months after the use of the appliance was discontinued. The patient was then 11 years, 6 months old. In relation to the orbital plane, the extreme mandibular protraction decreased, and at the last examination, the mandibular protraction no longer was present. The permanent maxillary cuspids had erupted by this time. Esthetically, at least, a good result was obtained.

The maxillary incisors, originally in linguoversion to the mandibular incisors, were brought into normal relation and there has been no reversion to

the original malocclusion in the anteriors, although there have been changes in the mandibular incisors.

In the relation of the lateral halves of the dentures to the median plane, there were no changes in the width of the arches. In the mandible, the median plane, which passed between the central incisors before treatment, passed through the left central incisor after treatment. In short, the mandible swung slightly to the right, and the occlusal relation of the molars definitely improved.

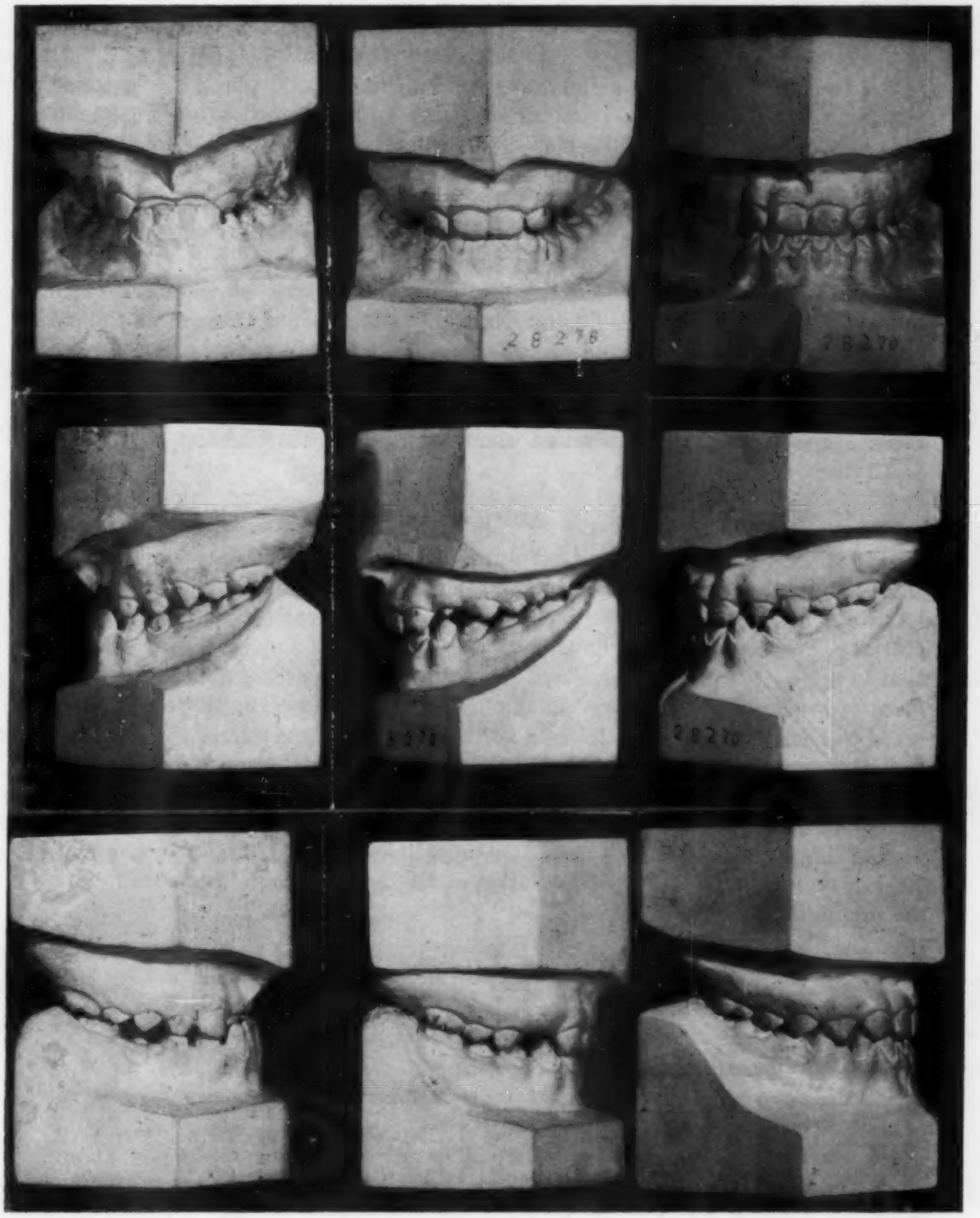


A. B. C.

Fig. 5.—Case 3. Occlusal and profile views. *A*, before treatment (at the age of 10 years, 9 months); *B*, at completion of treatment, three months later; and *C*, at the age of 11 years, 6 months.

At 11 years of age, the mandible swung to the left, for the midline can be seen to pass through the central incisors again.

In the relation of the dentures to the orbital plane, marked changes have occurred. In the maxilla, the 3-mm. distance from the orbital plane to prosthion,



A. B. C.

Fig. 6.—Case 3. Front and lateral views. *A*, Before treatment (at the age of 10 years, 9 months); *B*, at completion of treatment, three months later; and *C*, at the age of 11 years, 6 months.

which indicated a mild incisal retraction, increased to 6 mm.; this is a mild lateral retraction. The extreme lateral retraction became a mild lateral retraction. The checkup six months after treatment was completed showed no change in the relation of the maxillary teeth to the orbital plane.

In the relation of the mandibular teeth to the orbital plane, the extreme retraction of the incisal and lateral segments still remained after treatment. This was to be expected if the mandible had moved distally. In addition, the incisors showed an even more pronounced lingual version. At the age of 11 years, 6 months, the extreme incisal retraction became a mild incisal retraction, and the extreme lateral retraction changed to a medium lateral retraction. Since the mandible itself has not returned to a mandibular protraction (the profile photo proves that), the mandibular teeth must have drifted anteriorly with the resultant return to a developing Class III malocclusion. Unless the lingual version of the mandibular anteriors is corrected to labial version, and the teeth moved distally, the malocclusion will probably become worse.

The side view of the casts, which show the molar relationship, indicated a Class III malocclusion. Treatment corrected this but the checkup, at the age of 11 years, showed a relapse.

## SUMMARY

In all three cases, the most significant changes occurred in the relation of the dentures to the orbital plane. The mandible moved distally in each case to give a more esthetic appearance as well as a more satisfying functional occlusion. The mandible may have originally assumed its abnormal forward position to relieve the interference from the upper incisors, or the retarded development of the anterior maxillary region may have been caused by the habitual forward positioning of the mandible. In any event, the appliance freed the maxillary incisal region from mandibular interference and stimulated growth in the proper direction. The mandibular teeth remained in the same relation to the mandible, except in Case III, where they drifted forward and the lower incisors inclined to the lingual. In all three cases, the mandible shifted laterally into a more normal occlusal relation. In the relation of the dentures to the horizontal plane, no significant changes occurred.

I am indebted to Dr. George S. Callaway, who gave freely of his time and counsel in the preparation of these reports and to the Orthodontic Department of Columbia University for permission to use the necessary data. I am grateful to Dr. E. Brown and Dr. David Mossberg and to Mrs. Neva Wolf for their gracious cooperation.

## REFERENCES

1. Fisk, G. Vernon: The Treatment of Incipient Class III Malocclusion, Am. J. Orthodontics and Oral Surg. **25**: 518, 1939.
2. Hellman, Milo: An Introduction to Class III Malocclusion of the Teeth as Part of the General Problem in Orthodontia, Int. J. Orthodontia **23**: 120, 1937.
3. Todd, T. Wingate: Facial Growth and Mandibular Adjustment: Int. J. Orthodontia **16**: 1243, 1930.
4. Waugh, Leuman M.: Why Do We Have Orthodontic Failures? Am. J. Orthodontics and Oral Surg. **25**: 40, 1939.

# SOIL FERTILITY AND ITS HEALTH IMPLICATIONS

William A. Albrecht*

IT IS scarcely necessary to say that dentists have more than a passing interest in soil fertility, since they know that strong, healthy teeth contain a high concentration of calcium and phosphorus—nutrient elements that head the list of minerals drawn from the soil for sustenance of plant and animal life. Of the total gross weight of the teeth as part of the human skeleton, one-fourth is calcium and one-eighth is phosphorus. Of the tooth enamel, one-third is calcium and one-sixth is phosphorus.

As cardinal requisites of a fertile soil, calcium and phosphorus in the form of limestone and superphosphate are the two foremost fertilizers or soil treatments used by well-informed farmers. Too frequently, however, these treatments are regarded merely as a means of obtaining greater tonnage or more bushels of crops per acre.

But when shortages in bulk of foods confront us, it is all the more essential that we improve the quality of that bulk. It is the soil on which, after all, the health qualities of foods depend. When teeth are calling for much calcium and phosphorus, defective teeth are not far removed from crops that are calling in vain on the soil that is deficient in these two mineral constituents of man's skeleton and teeth.

*The Dental Profession Has a Real Stake in Soil Fertility.*—In addition to calcium and phosphorus, there are about ten more growth-promoting, body-building nutrients on the list of fertility elements that soils must provide for vigorous, healthy bodies and sound teeth. Shortages in any one of these elements needed in body construction, or in catalytic service in body or plant growth, will reappear in the human family as health deficiencies. We cannot therefore afford to tolerate shortages in the soil's store of these truly "grow" foods.

Besides these dozen so-called "grow" foods, or elements coming from the soil, every growing body and every growing plant must have what can conveniently be called energy providers or "go" foods. The elements constructing such compounds are, in the main, carbon, hydrogen, and oxygen. They come from the air and water. Nitrogen also comes from that source, so that as much as 95 per cent of plant mass or animal body weight is combustible. It serves in provision of energy and in giving bulk and weight.

*Photosynthesis and Biosynthesis.*—Because the recognition of mass is a simple mental impression, the concept of bulk is always easily and quickly caught. So commonly are crops measured by weight that we are just now coming to realize that the "growth" quality, or the nutritional value of herbages is not the same as the tonnage value. A bushel of corn is always 56 pounds, but one bushel may be nourishment while the other is not, as judged by livestock growth. Plants attain mass of growth through the service of sunshine as it

Read before the Mid-Continent Dental Meeting, St. Louis, Mo., Nov. 2, 1944.
*Department of Soils, College of Agriculture, University of Missouri.

makes carbohydrates through use of the sun's energy in the chlorophylous leaves. This process of chemical synthesis of carbon, hydrogen, and oxygen into carbonaceous products gives tonnage, but surely this photosynthetic behavior does not guarantee animal or human nourishment when it results in trunks of trees consisting only of just so much woodiness. Sunshine, fresh air, and water —processed through the suprasoil activities by plants—may be responsible for 95 per cent of plant bulk, yet contribute nothing to nourishment of higher life forms.

Nutritive values of herbages result from the synthesis of compounds within the growing plants, as for example, those that give rise to the seed and will feed our animals. These values are dependent on the calcium, phosphorus, magnesium, etc., that come from the soil. Animal life finds plenty of bulk for consumption. Recall hastily, if you will, the many plants which animals refuse to eat, or the many we call weeds. Nutritional deficiencies result from the failure of that vegetative bulk to have within itself the products of synthetic activities by the plant quite aside from products directly from photosynthesis. We need to appreciate that may well be called the "biosynthesis" or the synthesis by the life of the plant that depends not on air and water, but on the delivery by the soil of its complete list of soil fertility elements to be constructed by the plant into what is truly food substance.

In considering plants as phenomena of growth, we may well think of them first as a photosynthetic performance. This builds the woody frame of the plant, uses only limited amounts of soil fertility, mainly potassium, as catalytic agents, to set up the factory and provide its fuel supply. In the second place, plants are a biosynthetic performance, into which the soil fertility enters more directly to have its phosphorus, sulfur, nitrogen, etc., synthesized into proteins, vitamins, and other compounds truly valuable for body construction rather than for fuel only. It is the soil fertility much more than the sunshine and fresh air that determines how well the plant really gives us nourishment. It is this biosynthesis and not the photosynthesis whereby soil fertility takes on its significant implication in your health, in my health, in your teeth and in my teeth.

*Virgin Plant Growth Concentrated the Soil Fertility in the Surface Soils for Help to Man.*—That the entire land surface of the earth cannot be generous in its provisioning of human and animal life becomes almost axiomatic when it is known that the soil must deliver about a dozen chemical elements. Soils constructed under good physical conditions, and stocked with such a large number of nutrient elements, must of necessity be the exception rather than the rule. Plant life in virgin condition has been sending its roots down and searching through large volumes of soil to collect and assemble in the surface layer as organic matter or humus, these many elements needed. Hundreds of years of virgin condition have kept within the plant life, as a cycle of growth, death, decay, and re-use, these nutrient mineral elements from the soil. It is this feature that makes surface soil so valuable while subsoil is so unproductive.

*Soil Construction and Soil Destruction.*—Naturally, soils vary widely as to their fertility since soils are temporary rest stops of rock en route to the sea and to solution. In lower rainfall areas the soil is finely ground rock. It is

mainly mineral, with little clay and little water for plant growth. The plants grown there are mineral-rich, however. More rainfall gives more clay, more plant growth, more organic matter to decay. It also leaves a rock reserve to supply the clay as it gives up its nutrients to the plants. In central United States with its prairie areas, we have soils now in the stage of maximum of construction of clay that is in balance, or equilibrium, with a generous reserve of rich minerals to maintain productivity. With no more than 30 inches of rainfall along approximately the 97th meridian of the United States, we have the Midlands, where the animals raise themselves and human health is good as indicated by the fact that seven out of ten draftees pass inspection in Colorado while only three out of ten do so in a southern state.

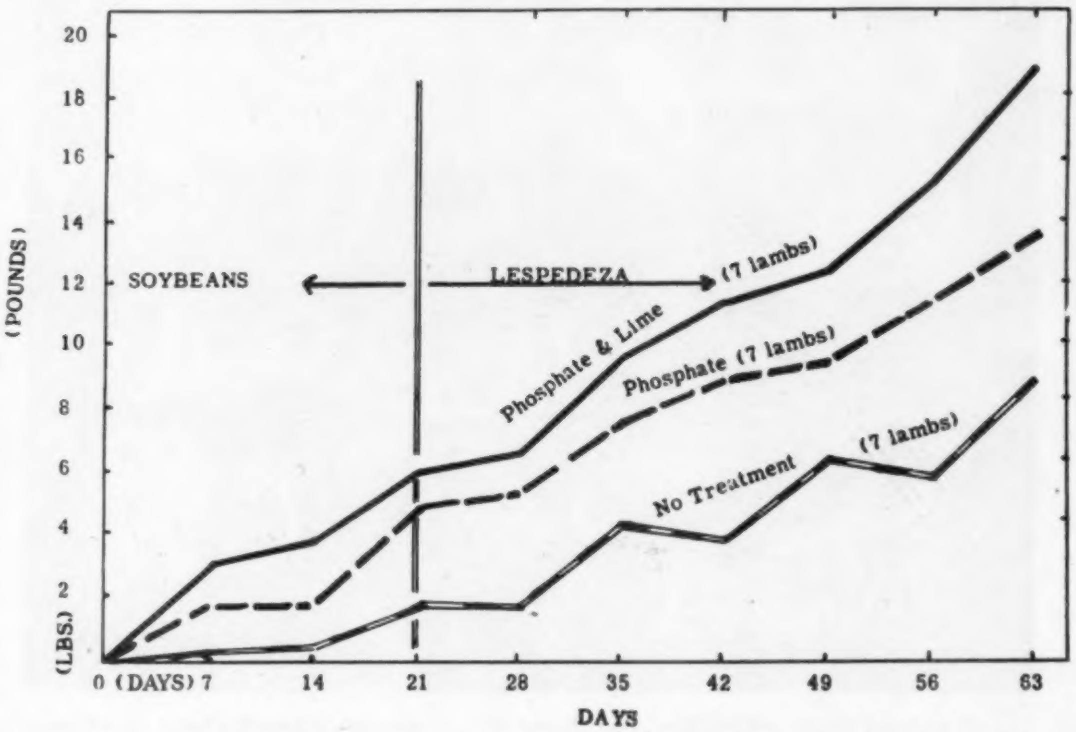



Fig. 1.—The curves represent the gains in weight per head by lambs consuming constant weight of grains and hays per head per day, but with the different hays grown on adjoining plots given different soil treatments. The efficiency of the meat-making animal depends on the efficiency of the food synthesis by the plant in terms of the soil that controls it.

With higher annual rainfalls and higher temperatures, the rocks are so highly weathered and the clay is so changed that it represents soil destruction. This is the prevailing condition in eastern and southeastern states. In terms of this degree of soil development we can see the basic principles of nutritional troubles in the southern states, of limited populations in the tropics, of population concentrations into limited areas of the temperate zones, of customs whereby aborigines survive while the white man fails utterly, and numerous seemingly uncanny situations where the influence of soil fertility upon the human species is not yet appreciated.

*Crop Juggling Disregards Soil Fertility.*—An ecological survey with tabulations of plant species is not needed to locate the forests in the northern regions,

in the tropics, and in eastern and southeastern United States, nor to locate the prairies in central United States, and the barrens in the West, excluding the western coast. Underlying this seeming agreement of greater vegetative production in forests with higher rainfall, and vice versa, there is the soil fertility. We have not been connecting the different crops, their tonnage production per acre, and their chemical composition in terms of nutritive value for animals with the soil fertility. That the scantily growing buffalo grass of western Kansas was more nutritious because of more fertile soils than the lush bluestem of eastern Kansas on the less fertile, more leached soils was recognized by the buffalo. This brawny beast stayed on his scant grazing because it meant growth, muscular and bony body, and good reproduction. There was no natural obstruction to prevent his coming eastward, had he desired to move to get more bulk per acre.


Fig. 2.—Animals discriminate very judiciously by grazing different plants to different degrees. That the animal is balancing its diet according to the plant composition determined by the soil is not commonly appreciated. This instinct may be serving the animal better than it is in the human.

More protein in the wheat as we move westward across Kansas follows the same course, with the less leached soils in central and western Kansas giving high protein in wheat. But in place of recognizing soil fertility as the controlling factor, we have been ascribing the difference to rainfall or to plant pedigrees. Plant breeding has been credited with wonders when we think of hybrid corn. But to date no geneticist's creation has yet come forward that can tolerate starvation or the lack of soil fertility.

Crops have been introduced, moved from place to place and pushed to the very fringes of starvation, while we have kept our attention fixed on the pedigree in place of the plant's nutrition. During this crop juggling, the chemical composition of the plant has shifted. Photosynthesis has come into prominence while biosynthesis has almost disappeared. The crop has retained

its service in giving energy values but lost much of its service as a growth food and carrier of soil minerals elaborated into organic complexes of nutritive value. We have gone from proteinaceousness and high mineral contents in plants grown on soils under construction through lower rainfall to carbonaceousness and mineral deficiencies in plants grown on soils under destruction through higher rainfalls. Nutrition at the same time has descended from a level of bone-building, brawn-making, and fecund reproduction to hydration, obesity, fattening performances and other excesses of weights with weakened bones and flabby muscles, to say nothing of carious teeth, alveolar bone disintegration, and other oral troubles.


Fig. 3.—Fertilizer treatments of the soil register their beneficial effects in the plant, but more noticeably in the physiology of the animal as indicated by better weight, wool, fur, bones, and other body products and functions. On the left, the rabbit and bones record the results of lack of soil treatment in contrast to the effect of treatment measured by similar gauges on the right.

*Declining Soil Fertility Brings the "Sweet Tooth."*—Declining soil fertility has been pushing out of the agricultural program those crops drawing heavily on the soil fertility, and naturally of high nutritive values. As such crops failed to produce tonnage, we have sought other crops maintaining the tonnage production per acre but failing to provide the nutritive equivalents per acre and the nutritive concentration or food value per pound. Carbonaceousness, consequently, has come into prominence, while proteinaceousness and high mineral contents have dwindled.

Declining soil fertility has been provoking the shift to feeding our animals on fattening feeds, and our own shift to soft wheats, and to starchy and saccharine elements in our diet. Our "sweet tooth" in a dietary sense has become a carious tooth in a dental sense as a result of the unobserved and unappreciated exploitation of the soil fertility, and shift in dominant plant composition.

*Failing Skeletons Go With Failing Teeth.*—When the simplest expression of the chemical composition of bones and teeth puts these two together in the

same category with their ash containing 894.5 parts of calcium phosphate per thousand parts, these two soil-borne elements, calcium and phosphorus, are lifted into prominence. This dare not, however, crowd out the 15.7 parts of magnesium phosphate, the calcium fluoride, the chloride and the carbonate of calcium as 3.5, 2.3, and 101.8 parts, respectively, and the 1.0 lone part of iron oxide. That this complexity in chemical composition of the teeth is no mere accident is well worth considering, and that it is a specific combination which makes for sound teeth only by good metabolism to maintain its specificity is also worthy of serious consideration. Shifts in the fluorine content, that makes up less than .013 per cent of the enamel of the teeth, are known for the troubles they cause. Can we not then appreciate the inevitable incidence of tooth and skeletal troubles when the supplies of calcium and phosphorus in the foods fluctuate widely in amounts and in chemical combinations ingested, while we keep our eyes fixed on food bulk only?

Animal studies are pointing out the widely variable thickness, size, strength, and other properties of bones of animals according as they are fed different hays, the same hays from different soils, or the same hays from the same soil given different soil treatments, such as limestone and phosphate. Hidden away as it is within the animal's body, the skeletal structure may be undergoing drastic shortages in calcium and phosphorus that are readily passed over without concern. Surely the jaws carrying the teeth cannot escape registering these same irregularities taking place in the other skeletal parts.

*To the Drugstore for Cure Rather Than to the Soil for Prevention.*—Even though the practice of salting domestic animals has been with us for scarcely a century and a half, we have taken readily to the belief that the deficiency in any essential element in the diet can be met by its ingestion as a simple chemical salt in its ionic and molecular forms. With sodium and chlorine, both of which are monovalent and extremely soluble, accepted in the common salt form by domestic animals and searched out in the "salt lick" by wild animals, there may be serious error in concluding that deficiencies of calcium phosphates in the diet may be met by ingesting the salts of tricalcium phosphate or calcium and phosphorus in one or the other acid phosphate forms. Calcium is a divalent and phosphorus is a pentavalent ion. The two are closely associated or combined chemically wherever phosphorus is found in Nature. They serve such important roles in plant life where sodium and chlorine are not considered essential that it should seem fallacious even to postulate that calcium and phosphorus as salts can serve as effectively in both processes as when they are part of the compounds elaborated by plant synthesis.

The eating habits of the animals themselves offer suggestions. The eating of bones by cattle is not common. It occurs only after the animal arrives at certain stages of emaciation resulting from feeds deficient in phosphorus. This is quite different from their behavior relative to sodium chloride of which the consumption does not suggest itself as an act of desperation.

The behavior of rachitic bones suggests that the advent of calcium and phosphorus into the digestion via the plant as it has taken them from the soil is more effective when these come through this route whereby it is synthesized as organo-complexes rather than simple mineral salts. When a rachitic bone is cut longi-

tudinally and immersed in ionic calcium phosphate solutions, the calcium and phosphorus are not readily deposited in the unmineralized bone parts. However, when such a bone is placed in a solution of calcium hexose monophosphate or calcium glycerophosphate, it absorbs the calcium and phosphates, to deposit them as minerals in the zone of the rachitic bone prepared for calcification. Such behaviors suggest that the organo-calcium phosphate may be a much more efficient means of introducing these bone-building ions into the skeleton and teeth than are calcium and phosphorus ingested simply as ionic salts.

Yeasts, as fermenters of sugars, require phosphates in order that this reaction giving off carbon dioxide may proceed. The phosphate acts seemingly as a catalyst. It enters into combination in one step in the process, but is not a part of the product. Thus, the phosphate is not serving in construction of the body of the yeast cell, or as a part of it. Rather it is serving in the chemical reaction that provides the energy for the life of the yeast. Calcium phosphate, as it serves in the energy reactions or metabolism of higher life, is still not a known phase of its behaviors in nutrition.

Here is the suggestion that the calcium and phosphate ions do not use the plant merely to hitchhike from the soil to the stomach of the animals. Rather it suggests that while these nutrient elements are helping in the biosynthetic performances within the plant, they are functioning in its metabolic performances and putting themselves into some unique organic combination through which they can move into the construction of the bones and teeth so much more effectively.

Then, too, when calcium gluconate, another calcium organo-complex injected into the blood stream, is an effective cure for milk fever, it emphasizes the plausibility of the belief that calcium and phosphorus in the blood stream in nondialyzable or colloidal form may be playing far more essential roles than we have been inclined to appreciate while focusing attention on them mainly in their ionic behaviors. Much about the physiologic activities of these two nutrient elements remains to be learned, but surely there are strong suggestions that as they play these roles we can aid their functions more from the soil forward by using them as fertilizers in the plants and thus for preventions, than from the drugstore backward and thereby as cures for nutritional troubles by which havoc has already been wrecked in the body.

*Other Aspects of Soil Fertility.*—Your attention has been focused specifically on but two nutrient elements of the dozen (possibly more) essential ones coming from the soil for human sustenance. If recognition of the deficiencies of these two in the soil has led us to understand the irregularities in plant physiology of the food crops we eat, and deficiencies in our teeth, our skeleton, and our own body physiology as all these provoke bad health, we need to prepare ourselves for more troubles arising as the remaining nutrient elements are being drawn from the soil. Potassium has long been registering its shortages for crops, but fortunately is so bountifully supplied by food plants that our bodies excrete rather than hoard it. Magnesium, however, which is the next on the list, cannot be viewed with so little concern. Shortages of this element in the soil are already impending. Heavy limings with calcium limestone only and soil conservation activities without attention to magnesium may throw a panic into body

physiology and sound teeth. Elements no more plentiful than fluorine required in drinking water by quantities as low as one part per million and coming in milk in from 5 to 25 parts per ten million are only beginnings in our thinking about several elements to which quantitative attention for health's sake has not been directed. We are soon to face the health problem linked with all the dozen (possibly more) nutrient elements contributed by the soil as we have just begun to connect rickets, teeth decay, and other troubles with calcium and phosphorus. With such a large list to be compounded into medicine by the drugstore, surely in desperation we ought to turn away from medicinal concoctions for cure and learn to put fertility into the soil so as to give help to Nature to nourish us for disease prevention instead.

*Public Health Calls for Conservation of Soil Fertility.*—The importance of the soil as the basis of our nutrition has not yet been appreciated. For too many of us, food comes only from the grocery and the meat market in paper bags, fancy cartons, glass bottles, and tin cans. We are measuring it only by weight or cost per plate. Milk is still sold by the gallon and by its fuel value in terms of fat content, when milk may be so deficient as to give rickets even to the calf taking it, uninjured by aeration and pasteurization, directly from the mother cow. Milk, which is closely connected with reproduction, is lowered in its quality even as the function of reproduction, itself, is impaired by nutritional deficiencies resulting from neglect of the soil. Reproductive cells, both as egg cells in the female or sperm cells in the male, are a physiologic output by the body for reproduction—just as milk is food for service to the young in the same reproductive process. Egg cells and sperm cells defective because of deficient soil fertility and malnutrition are just as possible physiologically as is defective milk.

To the observant dentist, teeth and the mouth as a whole reflect the nutritional plane of his patient and thereby reveal not only the irregularities in the quality of his food, but should point much farther back to the plane of soil fertility in the region where the patient's food was grown. With that extension of the view of your mind's eye as you look into the mouths of children, we trust you will catch some suggestion that you in an office on the paved street have some share in conservation of the soil that is owned and managed by the man of the country who may seemingly be miring in the mud. That mud is becoming more precious for health's sake.

**Honor Roll of Active Members**
**American Association of Orthodontists**
**Serving in the Armed Forces**

Dr. Herman Adelstein
Cleveland, Ohio
Dr. C. A. Allenburger
New Orleans, La.
Dr. W. R. Alstadt
Little Rock, Ark.
Dr. Carl R. Anderson
Grand Rapids, Mich.
Dr. E. W. Anderson
Cedar Rapids, Iowa
Dr. Walter Appel
Cheyenne, Wyo.
Dr. Richard E. Barnes
Cleveland, Ohio
Dr. Harvey G. Bean
Toronto, Ont., Can.
Dr. Henry C. Beebe
Boston, Mass.
Dr. J. Victor Benton
Wichita, Kan.
Dr. George F. Bowden
Denver, Colo.
Dr. W. A. Buhner
St. Petersburg, Fla.
Dr. Harry Cimring
Los Angeles, Calif.
Dr. Maynard E. Cohen
Boston, Mass.
Dr. Robert E. Coleman
Detroit, Mich.
Dr. Allen Collins
Detroit, Mich.
Dr. R. Burke Coomer
Louisville, Ky.
Dr. Willard D. Crapo
Los Angeles, Calif.
Dr. Wm. B. Currie
Indianapolis, Ind.
Dr. Arlo M. Dunn
Omaha, Neb.
Dr. George L. Englert
Camp Grant, Ill.
Dr. Frederick M. Epley
San Francisco, Calif.
Dr. Marion A. Flesher
Oklahoma City, Okla.
Dr. Gerald Franklin
Montreal, Que., Can.
Dr. Laurence Furstman
Los Angeles, Calif.
Dr. Raymond Gillespie
Fort Knox, Ky.
Dr. Paul E. Gilliam
Houston, Texas
Dr. Dennis D. Glucksman
New York, N. Y.
Dr. R. T. Goldsmith
Houston, Texas
Dr. Charles J. Goldthwaite
Worcester, Mass.
Dr. Harold S. Grohosky
Galveston, Texas
Dr. Murray M. Hall
Houston, Texas
Dr. George S. Harris
Detroit, Mich.
Dr. James Hilliard Hicks
Detroit, Mich.
Dr. J. S. Hoffer
Des Moines, Iowa
Dr. John Mather Jackson
Philadelphia, Pa.
Dr. Hammond L. Johnston
Baltimore, Md.
Dr. Claude S. Jones
Johnson City, Tenn.
Dr. William R. Joule
Kearney, N. J.
Dr. Matthew M. Kaufman
New York, N. Y.
Dr. Bernard Kniberg
Newark, N. J.
Dr. Frank J. Krivanek
Oak Park, Ill.
Dr. Harley G. Kushel
Rochester, N. Y.
Dr. Leo B. Lundergan
St. Louis, Mo.
Dr. Percy H. Lunn
Buffalo, N. Y.
Dr. Robert MacConkey
Rochester, N. Y.
Dr. Joseph L. McDowell
Ossining, N. Y.
Dr. John W. Makeig
Amarillo, Texas
Dr. Charles Mason
New York, N. Y.
Dr. Michael J. Maxian
New York, N. Y.
Dr. Herbert V. Muchnic
Los Angeles, Calif.
Dr. Marcus D. Murphey
Houston, Texas
Dr. Willis H. Murphey
Fort Worth, Texas
Dr. Morse R. Newcomb
Cleveland, Ohio
Dr. G. W. Oglestone
Saginaw, Mich.
Dr. Lowell T. Oldham
Mason City, Iowa
Dr. Reuben E. Olson
Wichita, Kansas

## Honor Roll of Active Members
## American Association of Orthodontists
## Serving in the Armed Forces

*(Continued)*

Dr. Ernest E. Palmatary
Kansas City. Mo.
Dr. J. D. Peak
Austin, Texas
Dr. William Adams Pressly
Greensboro, N. C.
Dr. E. B. Pulliam
Corpus Christi, Texas
Dr. Joe Tennyson Reece
New York, N. Y.
Dr. Paul V. Reid
Philadelphia, Pa.
Dr. John W. Richardson
Cleveland, Ohio
Dr. J. A. Rowe
San Antonio, Texas
Dr. Charles F. Russell
Waco, Texas
Dr. Earl E. Shepard
St. Louis, Mo.
Dr. Carl H. Showalter
Santa Cruz, Calif.
Dr. Milton Siegel
Albany, N. Y.
Dr. Saul Simon
Toronto, Can.
Dr. L. Scroggs Singleton
Los Angeles, Calif.
Dr. Henry Spiller
Brooklyn, N. Y.
Dr. Arnold E. Stoller
Seattle, Wash.
Dr. Martin S. Strickler
Chicago, Ill.
Dr. Bernard F. Swain
Morristown, N. J.
Dr. D. Robert Swinehart
Baltimore, Md.
Dr. Jack Taylor
Santa Monica, Calif.
Dr. Henry J. Toomey
Cleveland, Ohio
Dr. Louis F. Tinthoff
Peoria, Ill.
Dr. M. A. Ukena
Marshalltown, Iowa
Dr. Alexander L. Ungar
New York, N. Y.
Dr. Ott L. Voigt
Waco, Texas
Dr. William F. Walsh
Stockton, Calif.
Dr. Robert L. Whitney
Pasadena, Calif.
Dr. Tom M. Williams
Dallas, Texas
Dr. G. F. Wilson
Orlando, Fla.
Dr. Seymour L. Winslow
Santa Rosa, Calif.
Dr. Claude R. Wood
Knoxville, Tenn.
Dr. S. H. Yoffe
Harrisburg, Pa.
Dr. Sidney Zeitz
Brooklyn, N. Y.

### Regular Army Service Members

Col. Harry Deiber
Col. Neal Harper
Col. Wm. H. Siefert
Col. Richard F. Thompson
Col. L. B. Wright

There may be members in the Service whose names do not appear in the above list. These members should notify the secretary at once so that their names may be included.

Max E. Ernst, Secretary, American Association of Orthodontists, 1250 Lowry Medical Arts Bldg., St. Paul, Minn.

# Department of Orthodontic Abstracts and Reviews

Edited by

DR. J. A. SALZMANN, NEW YORK CITY

All communications concerning further information about abstracted material and the acceptance of articles or books for consideration in this department should be addressed to Dr. J. A. Salzmann, 654 Madison Avenue, New York City

**The Complete Pediatrician**: Practical, Diagnostic, Therapeutic and Preventive Pediatrics. Fourth Edition. For the use of medical students, interns, general practitioners, and pediatricians. By Wilbert C. Davidson, M.A., D.Sc., M.D., Professor of Pediatrics, Duke University School of Medicine, and Pediatrician, Duke Hospital. Pp. 256, Price $4.00. Durham, N. C. Printed by Suman Printery for Duke University Press, 1943.

This book emphasizes symptoms and signs as clues to disease but does not present extensive descriptions. An effort is made to emphasize the recognition of normal children and the necessity of keeping them normal, based on the knowledge of growth, development, and prevention. Importance is given as well to the recognition of sick children, their diseases, and what to do for them.

Under "Dentition and Mouth Abnormalities" a series of diseases is presented. The statement is made that irregular teeth are usually hereditary and only rarely caused by thumb-sucking and adenoids. It is our opinion that malocclusion is only rarely caused by heredity and that many dental irregularities are due to local causes, such as disturbances in the pattern of tooth eruption, dental neglect, and dentofacial habits other than thumb-sucking, not that the latter cannot be a cause of malocclusion when practiced over a long period of time. Regarding orthodontics the author states, "If a child's second teeth are very crooked, and malocclusion is present, they should be straightened by an expert. Supernumerary teeth usually should be removed, and impacted teeth treated conservatively. The discomfort involved may cause nervousness and the expense is often high, but the improvement in the child's appearance, especially in girls, increases self-confidence and morale."

The author is more at home in the general field of pediatrics. In the chapter on "Growth, Development and General Care of Children," there is information and physical and psychological measurement of development, including weight, height, head measurements, dental developments, head change, and other valuable data.

The art of correct diagnosis, it is pointed out, depends on the collection of evidence, recalling of the conditions which may account for the symptoms, and evaluation of the material. The last of the three steps depends on training and experience, while the first two attributes are to be obtained from a study of this book.

**Bimaxillary Protrusion**: By Samuel J. Lewis, D.D.S., Detroit, Mich., Angle Orthodontist **13**: 51-59, July and October, 1943.

Simon uses the term "bimaxillary protraction," which is synonymous with protrusion. He added to Case's description by differentiating the various types of protrusions. He divides protraction into two groups: (1) Dental protraction, when the teeth are not in perpendicular or upright position because the crowns are tipped anteriorly, and (2) pure alveolar protraction when the teeth may or may not be in an upright position but there is more or less prominence of the alveolar process and the lips are correspondingly prominent. He further divides protractions into such subgroups as alveolar protraction plus anterior dental protrusion, and alveolar protraction plus anterior dental retraction, or retrusion.

Simon stated that in alveolar protraction plus anterior dental protrusion the orbital line usually passes considerably to the posterior because of the anterior alveolar deviation, whereas in alveolar protraction plus anterior dental retraction the orbital line may pass directly through the canine cusp, so that the sagittal oblique position of the teeth, the roots of which are malposed anteriorly, permits us to conclude that an alveolar protraction presents itself.

Simon, then, was really the first to present a comprehensive picture and description of bimaxillary protrusions from the morphologic point of view. It is a sad commentary that in the heat of argument and criticism of methodology most orthodontists have missed the real significance of Simon's contribution to the science of orthodontics. It is encouraging that the fruits of his labors are now beginning to be appreciated and understood.

In the interval between the publication of Simon's work and that of the paper of Dr. Charles H. Tweed on "The Principles of the Edgewise Arch in the Treatment of Malocclusion" the subject of bimaxillary protrusion was almost ignored in orthodontic literature. In his paper Dr. Tweed wrote: "My experience has shown that the most unstable, and therefore the most difficult, patients to retain successfully are those in which both the maxillary and mandibular teeth are too far forward in relation to their respective bases, or are in double protrusion."

In the treatment of bimaxillary protrusion, two factors are of paramount importance, namely, esthetic improvement of the dentofacial area and the establishment of a stable denture that embodies the requirements of the line of occlusion.

In 1923 Lundstrom published his paper on "Malocclusion of the Teeth Regarded as a Problem in Connection With the Apical Base." This paper was essentially an analysis of his own practice, comprising over 600 treated cases, most of them failures. In sum, he found that there was a definite relation between the teeth and the apical bone, and that attempts at correcting malocclusion by mechanical means are not necessarily accompanied by a development of the apical base in harmony with the position of the teeth, and that such methods do not maintain the teeth in occlusion. He further stated that the size of the apical base is not dependent upon masticatory function. This concept has led many of us, mistakenly, to produce normal cusp relation

in the hope that Nature would build bone around these often misplaced teeth. However, Nature will not necessarily build bone around teeth that have been moved or tipped off the basal bone.

Simon, realizing the limitations of mechanical movement of teeth, and guided by his findings on gnathostatics, said that either the bimaxillary protraction should be left untreated or that the four first premolars should be extracted and the anterior segments moved posteriorly. He did not believe in the rationale of attempting to move the entire denture posteriorly, because when the third molars erupted they would have a tendency to shift the denture forward again. It would be well for all of us to reread Simon's work in what Dr. Angle once called "an attitude of friendly hostility."

Tweed had been struggling for years to bring about normal occlusion in dentures that were, as he said, "in bimaxillary protrusion," only to fail to produce satisfactory results, either functionally or esthetically. He came to the conclusion that, confronted with a mechanical and physiologic impossibility, and with a choice of retaining thirty-two teeth all out of the line of occlusion, thereby wreaking havoc to a face and possibly to a life, or of resorting to the removal of all four first premolars and placing the remaining twenty-eight teeth in the line of occlusion, it should not be difficult to decide the proper procedure to follow.

Though the mechanical treatment of all bimaxillary protrusions has for the most part been of one type—that of extracting the four first premolars and retracting the teeth of the anterior segments of both arches by pitting them against the teeth of the buccal segments—one must take into consideration also the many factors possibly involved in producing the protrusion.

If the bimaxillary protrusion is the result of improper application of mechanical principles and the teeth have been tipped too far forward on the basal bone, and the basal bone is of normal size, extraction of the first premolars is contraindicated. A case is illustrated of orthodontically produced bimaxillary protrusion with what seems to be a normal basal bone or area. The case was originally treated by an orthodontist for five years. In the belief that the apices of the roots of the anterior teeth were actually on the base or very near to their normal positions on the base, the orthodox type of treatment was followed in accordance with Tweed's technique. The denture is a stable one, and the facial appearance was certainly much improved.

However, if we have an orthodontically produced bimaxillary protrusion in which the basal bone seems too small to accommodate a full complement of teeth, in which case there is usually a break in the lower incisor contacts, or the protrusion is of the type described by Simon as a bimaxillary alveolar protraction plus a dental protraction, then extraction of all the first premolars seems to be the only remedy. A case of this type is illustrated.

There is still another type of bimaxillary protrusion in which, though partial improvement of the facial lines and occlusion may be effected, the results are far from as pleasing to the eye as in the former types. In the case illustrated, the patient was a young woman 28 years old. She presented because she had difficulty in closing her lips and in pronouncing certain syllables, especially while singing. She complained also of a constant dryness in her mouth and throat, owing to the forced mouth breathing. One can readily see

that no matter how many teeth were extracted, there were limitations in treatment and that only a comparative improvement could be realized. The four first premolars were extracted and the anterior segments were moved posteriorly, with the result shown. The symptoms she described have all disappeared.

The importance of retracting the teeth of the anterior segments in such a way as to eliminate the anterior movement of the buccal segments as far as possible and to close the space in order to prevent a V-shaped space between the cuspid and second premolar cannot be overemphasized. In such cases the cuspid teeth are first moved distally to some degree without disturbing the incisor teeth. This movement is accomplished by utilizing the teeth of the buccal segment as anchorage and starting movement of the cuspid tooth to break down resistance of this tooth to distal movement. It can best be accomplished with the loop introduced by Kesling. If the cuspid teeth are not lying or tipped too far forward, they should be moved approximately two-thirds the distance by attaching the loop to the distal staple of the cuspid band, in order to eliminate the possibility of rotation. If the cuspid is leaning forward at a very abrupt angle, it is well to move it distally with this loop approximately three-fourths of the distance of the space before placing a complete arch. When this movement is accomplished, a complete arch with two Kesling loops is incorporated to complete most of the rest of the distal movement required. The final closing of the space and the uprighting of the roots is accomplished with the edgewise arch without loops, utilizing the cinching principle.

One word of caution: If the apices of the roots of the anterior teeth are, or seem to be, in normal basal position, the incisal segment of the orginal complete arch should be rounded off. Otherwise, there is danger of torquing the roots forward and displacing the teeth bodily off the basal bone. Once the spaces are properly closed, the regular rectangular arches are utilized to prepare anchorage, accomplish the en masse movement required, and attain artistic positioning of the teeth in accordance with the individual facial type.

**The Angle of Axial Inclination of Human Central Incisor Teeth**: By Harold J. Noyes, B.S., D.D.S., M.D., Charles H. Rushing, D.D.S., M.S.D., and Hugh A. Sims, D.D.S., M.S.D., Chicago, Ill., Angle Orthodontist **13**: 60, July and October, 1943.

In a study of the relation of certain skeletal structures revealed in the cephalometric x-rays of adult persons, the axial inclinations of mandibular and maxillary incisor teeth were recorded. Because of the current interest in this subject and for the benefit of comparison with other similar contemporary studies, a preliminary report of this investigation is made with no thought of drawing any conclusions from the findings based upon so limited samples of human material.

Material for the study included nine adult Indian dry skulls and fourteen white living males between the ages of 22 and 34 years, both groups having erupted a full complement of permanent teeth which were within normal limits of occlusal relations. Also thirty living white subjects, twenty-one of whom were male and nine female, all over 18 years of age with all permanent

teeth present. Of this group fifteen had dental arch relations in Class II, Division 1, and fifteen in Class III malocclusion. Lateral and frontal cephalometric x-rays of all heads were made by means of the Broadbent-Bolton cephalometer.

*Comment.*—Without attempt to draw conclusions from these restricted data the following observations seem of interest:

1. An overlapping range and average deviation between similar measurements of teeth in normal occlusion and Class II, Division 1, and Class III malocclusion.

2. A similarity of the mean angle of maxillary incisors in normal and both classes of malocclusion.

3. A similarity of mean angle of mandibular teeth in normal and Class II, Division 1 malocclusion.

4. An increased range and average deviation in malocclusion.

5. A similarity of the mean angle of maxillary to mandibular incisor teeth of all groups suggesting compensatory tendency in the complementary dental arches.

# News and Notes

## Pacific Coast Society of Orthodontics

NORTHERN SECTION

The meeting of the Northern Section of the Pacific Coast Society of Orthodontists was held in Seattle, Jan. 15, 1945.

Members present at the College Club for dinner and program: Drs. George A. Barker, E. Allen Bishop, Emery J. Fraser, Paul D. Lewis, Donald C. Mac Ewan, Harry N. Moore, R. Gothenquist, all of Seattle; Milton H. Fisher, Tacoma; J. E. Richmond, Eugene; E. W. Tucker, Butte.

After considerable discussion by Dr. Tucker, the chair appointed Dr. Paul Lewis to look into the possibilities of having the University of California Dental Division conduct one of its annual Dental Seminars in the district.

Dr. E. A. Bishop, chairman of the program for this meeting, then took over and presented the essayist of the evening, Dr. Donald C. Mac Ewan, who read a paper entitled ''Velopharynogeonal Dyscatabrosis.'' The paper was followed by a display of models showing points touched on in paper.

Dr. Bishop gave a case report with models showing results of head-cap treatment only, on a 7-year-old child with maxillary protraction.

CENTRAL SECTION

The quarterly meeting of the Central Section was held at the Alexander Hamilton Hotel in San Francisco, March 13, 1945.

Vernon Hunt introduced the speaker of the evening, Dr. John K. Young, Associate Professor of Bacteriology and Pathology at the College of Physicians and Surgeons. Tracing the development of the facial processes from 3 weeks of age, Dr. Young explained and illustrated with diagrams and kodachromes the various possible abnormalities in both soft and hard tissues if the growth pattern does not continue in normal fashion. The paper was well received and followed by the latest report on Penicillin.

SOUTHERN SECTION

The regular quarterly meeting of the Southern Section of the Pacific Coast Society of Orthodontists was held March 23, 1945, at the Ambassador Hotel, Los Angeles.

The paper of the evening was read by Dr. C. F. Stenson Dillon on ''Orthodontic Diagnostic Procedure.'' This was a detailed examination of faults in present-day diagnostic procedure, with suggestions for improvement. The keynote of Dr. Dillon's talk was ''Think.''

Dr. Hays Nance discussed Dr. Dillon's paper, illustrating with models showing final results years after discontinuance of retention.

## Association of Dental Alumni of Columbia University

The Twentieth Annual Spring Meeting of the Association of Dental Alumni of Columbia University at the Hotel Pennsylvania, New York, N. Y., Thursday evening, May 24, 1945, at 8:15 P.M., will serve a threefold purpose.

The primary purpose of the meeting will be a mass protest against the merger of the dental school with the medical school. Speakers will include Dr. Sterling V. Mead, President-Elect of the American Dental Association. The meeting will also witness the presentation of plaques to four former members of the faculty: Dr. H. S. Dunning, Dr. Wm. B. Dunning, Dr. L. Hartman, and Dr. L. M. Waugh. Members of the Association will elect officers for the year 1945-1946.

## Note of Interest

Dr. James E. Rook announces the removal of his office from 6677 Delmar Boulevard, to 6651 Enright Avenue, University City 5, Missouri. PArkview 8591. Practice limited to orthodontics.

# OFFICERS OF ORTHODONTIC SOCIETIES*

## American Association of Orthodontists

| | |
|---|---|
| *President*, Archie B. Brusse | 1558 Humboldt St., Denver, Colo. |
| *President-Elect*, Earl G. Jones | 185 East State St., Columbus, Ohio |
| *Vice-President*, Will G. Sheffer | Medico-Dental Bldg., San Jose, Calif. |
| *Secretary-Treasurer*, Max E. Ernst | 1250 Lowry Medical Arts Bldg., St. Paul, Minn. |

## Central Section of the American Association of Orthodontists

| | |
|---|---|
| *President*, Arthur C. Rohde | 324 E. Washington Ave., Milwaukee, Wis. |
| *Secretary-Treasurer*, L. B. Higley | 705 S. Summit St., Iowa City, Iowa |

## Great Lakes Society of Orthodontists

| | |
|---|---|
| *President*, Willard A. Gray | Medical Arts Bldg., Rochester, N. Y. |
| *Secretary-Treasurer*, C. Edward Martinek | 661 Fisher Bldg., Detroit, Mich. |

## New York Society of Orthodontists

| | |
|---|---|
| *President*, Raymond L. Webster | 155 Angell St., Providence, R. I. |
| *Secretary-Treasurer*, Norman L. Hillyer | Professional Bldg., Hempstead, N. Y. |

## Pacific Coast Society of Orthodontists

| | |
|---|---|
| *President*, J. Camp Dean | 1624 Franklin St., Oakland, Calif. |
| *Secretary-Treasurer*, Earl F. Lussier | 450 Sutter St., San Francisco, Calif. |

## Rocky Mountain Society of Orthodontists

| | |
|---|---|
| *President*, Henry F. Hoffman | 700 Majestic Bldg., Denver, Colo. |
| *Secretary-Treasurer*, George H. Siersma | 1232 Republic Bldg., Denver, Colo. |

## Southern Society of Orthodontists

| | |
|---|---|
| *President*, Amos S. Bumgardner | Professional Bldg., Charlotte, N. C. |
| *Secretary-Treasurer*, Leland T. Daniel | 407-8 Exchange Bldg., Orlando, Fla. |

## Southwestern Society of Orthodontists

| | |
|---|---|
| *President*, Harry Sorrels | Medical Arts Bldg., Oklahoma City, Okla. |
| *Secretary-Treasurer*, James O. Bailey | Hamilton Bldg., Wichita Falls, Texas |

## American Board of Orthodontics

| | |
|---|---|
| *President*, Frederic T. Murlless, Jr. | 43 Farmington Ave., Hartford, Conn. |
| *Vice-President*, Joseph D. Eby | 121 E. 60th St., New York, N. Y. |
| *Secretary*, Bernard G. deVries | Medical Arts Bldg., Minneapolis, Minn. |
| *Treasurer*, Oliver W. White | 213 David Whitney Bldg., Detroit, Mich. |
| James D. McCoy | 3839 Wilshire Blvd., Los Angeles, Calif. |
| Claude R. Wood | Medical Arts Bldg., Knoxville, Tenn. |
| James A. Burrill | 25 E. Washington St., Chicago, Ill. |

---

## Harvard Society of Orthodontists

| | |
|---|---|
| *President*, Francis J. Martin | 1074 Centre St., Newton, Mass. |
| *Secretary-Treasurer*, Edward I. Silver | 80 Boylston St., Boston, Mass. |

*The Journal will make changes or additions to the above list when notified by the secretary-treasurer of the various societies. In the event societies desire more complete publication of the names of officers, this will be done upon receipt of the names from the secretary-treasurer.

**Washington-Baltimore Society of Orthodontists**

*President,* Meyer Eggnatz - - - - - - - - - - - Medical Arts Bldg., Baltimore, Md.
*Secretary-Treasurer,* William Kress - - - - - - - Medical Arts Bldg., Baltimore, Md.

**Foreign Societies***

**British Society for the Study of Orthodontics**

*President,* S. A. Riddett - - - - - - - - - - - 42 Harley St., London, W. 1, England
*Secretary,* R. Cutler - - - - - - - - - - - 8 Lower Sloane St., London, S.W. 1, England
*Treasurer,* Harold Chapman - - - - - - 6 Upper Wimpole St., London, W. 1, England

**Sociedad de Ortodoncia de Chile**

*President,* Alejandro Manhood - - - - - - - - - - - - - Avda. B. O'Higgins 878
*Vice-President,* Arturo Toriello - - - - - - - - - - - - - - - - Calle Londres 63
*Secretary,* Rafael Huneeus - - - - - - - - - - - - - - - Calle Agustinas 1572
*Treasurer,* Pedro Gandulfo - - - - - - - - - - - - - - - - - - Calle Londres 63

**Sociedad Argentina de Ortodoncia**

*President,* Vicente A. Bertini
*Secretary,* Ludovico E. Kempter
*Treasurer,* Edmundo G. Locci

**Sociedad Peruana de Ortodoncia**

*President,* Augusto Taiman
*Vice-President,* Ricardo Salazar
*Secretary,* Carlos Elbers
*Treasurer,* Gerardo Calderon

**Asociación Méxicana de Ortodoncia**

*President,* Guillermo Gamboa - - - - - - - - - - - - - - - - - - - Madero 34-3
*Secretary,* Rutilio Blanco - - - - - - - - - - - - - - - - - - - Donceles 98-209
*Treasurer,* Carlos M. Paz - - - - - - - - - - - - - - - - - - Av. Insurgentes 72

*The Journal will publish the names of the president and secretary-treasurer of foreign orthodontic societies if the information is sent direct to the editor, 8022 Forsythe, St. Louis 5, Mo., U. S. A.